Croplife®

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PRODUCTION EDITION

for Manufacturers of Chemicals for Agriculture

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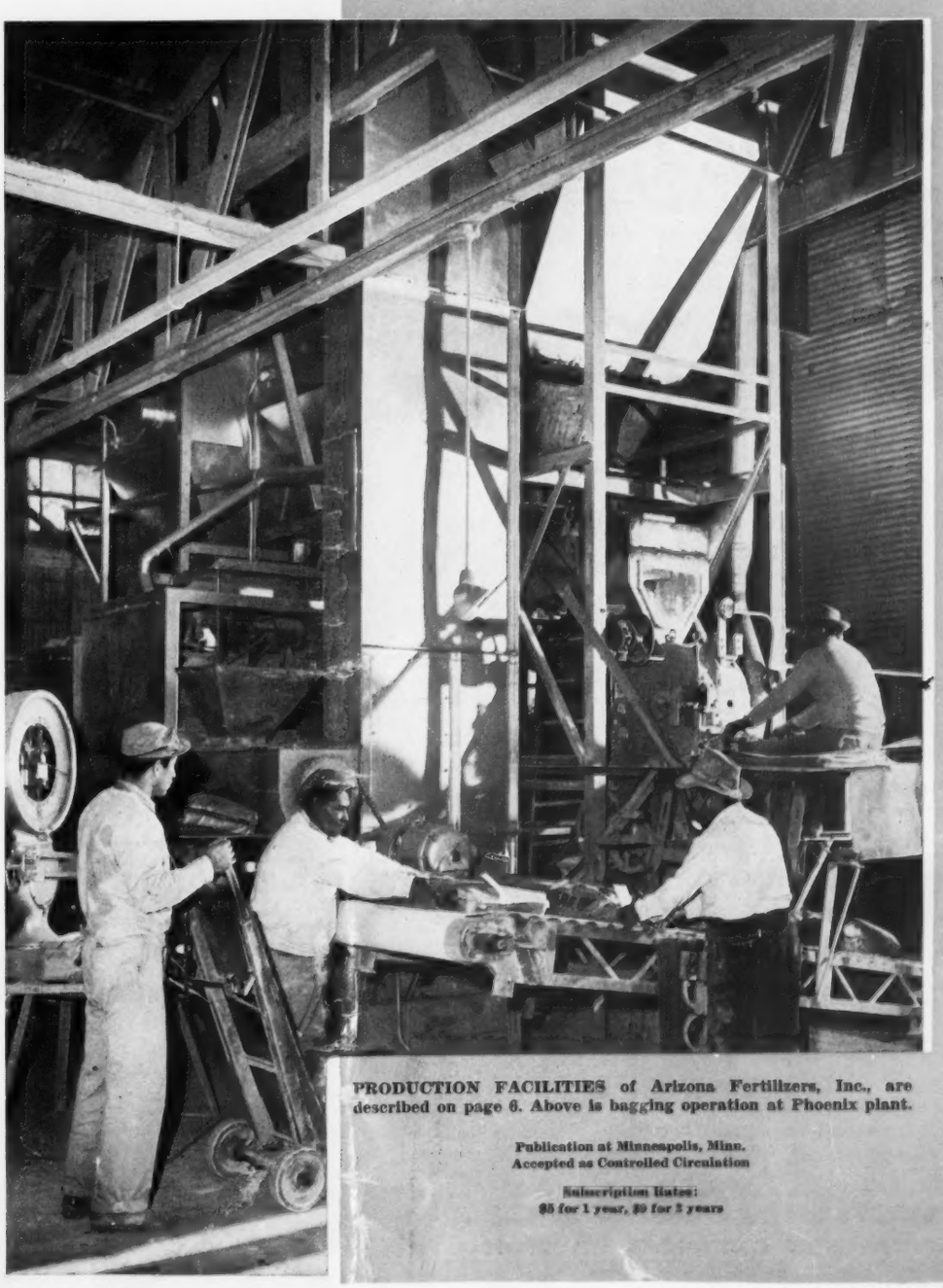

PRODUCTION FACILITIES of Arizona Fertilizers, Inc., are described on page 6. Above is bagging operation at Phoenix plant.

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Plant Food Is Plant Food, But . . .

Contentions of Many Years Still Rage Over Organics vs Chemicals

By Dr. Vincent Sauchelli
Chemical Technologist
National Plant Food Institute

WHAT is there about soil organic matter in relation to crop growth that makes it a perennial argument? Why can't the scientists give answers definitive enough to convince the advocates of the manure pile that their contentions ignore the modern facts of plant growth? One answer is, perhaps, that "a man convinced against his will is of the same opinion still."

In Haughley, Suffolk County, England, the organic advocates started an experiment about a decade ago to demonstrate the soundness of their claims. Lady Eve Balfour and Miss Alice Debenham, two famous leaders of the "organic school," determined to do something about this question. They put their neighboring farms in trust for the purpose of comparing on a long-term, scientific basis the so-called organic and chemical methods of farming and to demonstrate that crops grown with organics only were more nutritious than chemically fertilized harvests. The experiment has been conducted by a group called The Soil Association.

Their decision to provide these farms was undoubtedly fostered by the support of medical enthusiasts in the organic method of farming. For example, early in 1939 about 600 medical practitioners in Great Britain signed a sort of "medical testament" calling for research on the soil-plant-animal-man relationship and for greater support of existent, voluntary research. Again, in 1957, almost twenty years later, 230 physicians and 170 dentists in Great Britain issued a new declaration, in many respects similar to the 1939 statement.

One British critic* discussing these statements has pointed out that both statements showed an absence of (1) evidence relating human health disorders to systems of soil or crop nutrition and (2) absence of cogent reasons why a national research project should be authorized to investigate relationships between soil fertility and health.

In 1952 the experimental project at Haughley was put under the direction of a recognized authority in biology, Dr. R. F. Milton. This action encouraged the hope that the project would in time produce measured evidence of the validity of any findings. Up to the appointment of Dr. Milton the project was criticized on the basis that the experiments, as being conducted, were incapable of producing conclusive results since the plot work was not carried out in duplicate or triplicate and could therefore not be analyzed by statistical techniques.

Over-enthusiasm leading to overstatement and sharp attacks on differing viewpoints have all too frequently characterized this perennial controversy on the merits of organic and chemical methods of fertilization. The annual reports of the Soil Association on the project at Haughley have shown restraint and more objectivity. Dr. Milton has emphasized that the object of the experiments is to get information on the respective merits of the two types of farming with special reference to "the quality" in foodstuffs in addition to "the quantity." The evaluation of quality is not simple because it is not possible to define it. Chemical as well as biological assays are required—"quality" must be tested with animals and with humans.

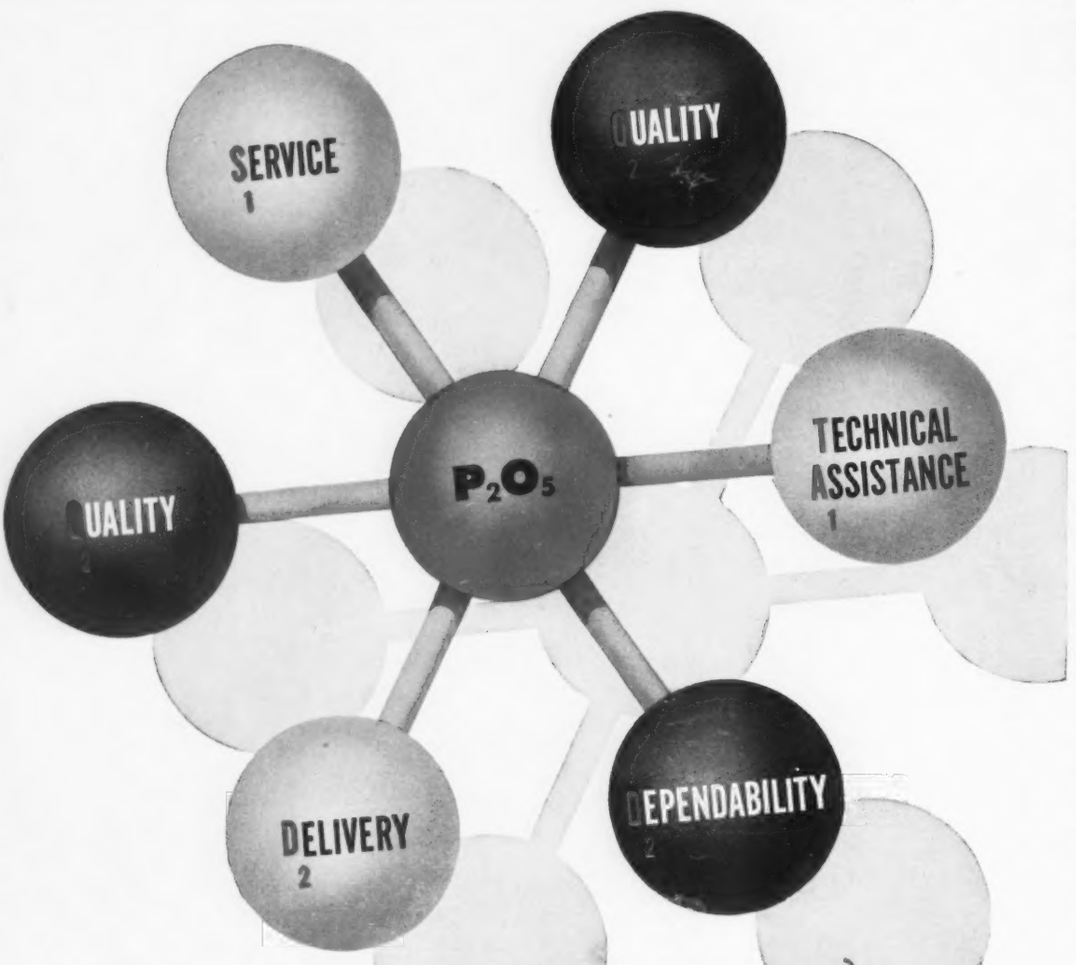
Most scientists are frank to say they do not yet know the true significance of organic matter in the soil. This is one of the most challenging questions in agriculture and in nutrition. In this country and in many other advanced countries of the world the question of soil organic matter in its possible nutritional relationships is being vigorously investigated. The experiments at Haughley should help resolve many facets of the controversy and for many reasons this unique research project deserves support and careful appraisal. Up to this year the findings at Haughley do not prove or indicate that chemical fertilizers need not be used in farming. They show favorable results with organics as well as chemicals.

The modern concept of fertilizers is that they are used to correct deficiencies that limit crop yields. Agronomists everywhere have convincingly shown that each increment of the right kind of fertilizer produces an increase in yield until the deficit has been fully corrected, at which time no further increase in yield occurs with an increase in fertilizer applications. This concept is based upon the principle that no more plant nutrients are applied than are already present in sufficient amounts to produce a normal, maximum yield per acre. It is not the purpose to produce an abnormally inflated yield. The organic-only advocates would have one believe that fertilizers provide only parts of the whole. Perhaps, but, as previously stated, those parts are the particular deficient nutrients in cultivated soils.

Orthodox agricultural science is willing to concede the value of organic matter in the soil as a factor in promoting crop growth. It is not will-

* D. P. Hopkins, author and chemist.

Turn to **ORGANICS** page 31



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QUESTIONS

	True	False
1. Inorganic salts are frequently added to oil-water systems to break emulsions.	☐	☐
2. It is impossible to prepare practical emulsions in which the aqueous phase contains high concentrations of inorganic salts.	☐	☐
3. Good agricultural emulsifiers may be characterized as individual specific chemical compounds.	☐	☐
4. The anionic components of an agricultural emulsifier impart improved performance in soft water.	☐	☐
5. A good emulsifier can be fully characterized by the ratio of anionic to nonionic components.	☐	☐
6. The active ingredient content of an emulsifier is the chief criterion of its efficiency.	☐	☐
7. Variations in toxicant, solvent and waters require adjustments in emulsifier blend for optimum performance.	☐	☐
8. The ratio of the emulsifiers in a matched pair need not be altered when the concentrate is used at high or low dilution rates.	☐	☐
9. In general, it is safer to formulate slightly higher on the nonionic side than on the anionic side when employing matched pairs.	☐	☐
10. Most formulators use the correct amount of emulsifier in their emulsifiable concentrates.	☐	☐

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ANSWERS

1. True. Most emulsifiers "salt out" in the presence of inorganic salts which impairs their function and breaks the emulsion.
2. False. Emcols H-A, H-B and H-C are used to emulsify insecticides in concentrated mixed fertilizer solutions in which the salt concentration may approach saturation. These emulsifiers have a unique tolerance to high salt concentrations.
3. False. Most efficient agricultural emulsifiers are blends of several anionic and nonionic surfactants.
4. True, if properly balanced with nonionic components. Conversely, the nonionic components of such an emulsifier impart improved performance in hard water.
5. False. It is not sufficient to balance the anionic-nonionic ratio. Since both anionic and nonionic components have hydrophilic and lipophilic properties, each in turn must be properly balanced to obtain maximum efficiency at the minimum use level. This requires blending several components, in some cases as many as 12 different surfactants.
6. False. The composition of the separate components and their balance is the prime consideration.
7. True. This is achieved most conveniently by the use of matched pairs of emulsifiers.
8. False. The rate of dilution required by the particular field application affects the blend of the matched pair necessary for optimum performance.
9. True. An excess of nonionic may result in excessive creaming which can easily be redispersed, but an excess of anionic may result in a tendency toward oil separation.
10. Only you can answer this. If you are using Emcols, you are saving money because they can be used at low use levels and give outstanding aging stability. Low moisture content, the rigidly controlled components, and Emcol know-how allow you to manufacture superior concentrates at competitive prices.

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Fertilizer Plant Liked by Townspeople Shows Results Of Public Relations Effort

ALBERT LEA, Minnesota, a thriving town in the southern part of the state is the location of an equally-thriving fertilizer plant of Smith-Douglass Co. The plant's general manager, Mel Mawhinney, well-known in Upper Midwest agricultural circles, states that the firm enjoys unusually good public relations and that the townspeople are proud to have the plant in their midst.

In the face of contrary experiences on the part of numerous other fertilizer producers, how has this particular plant managed to rate the accolades of the city's people?

Mr. Mawhinney declares that the job isn't difficult if management has the whole-hearted cooperation of the plant's personnel, and if the policies of the parent company are likewise favorable to the extra chores that make for good housekeeping, attractive surroundings, and just plain neighborliness. The S-D plant at Albert Lea has all of these qualifications.

R. D. Ausen, superintendent of the works, and C. A. Flann and Lyle Berg, production foremen, all contribute to the general project of keeping things in shipshape at all times. Also, the company's analysis control laboratory is kept spotless by R. R. Yeager, chemist. It all adds up to good public relations.

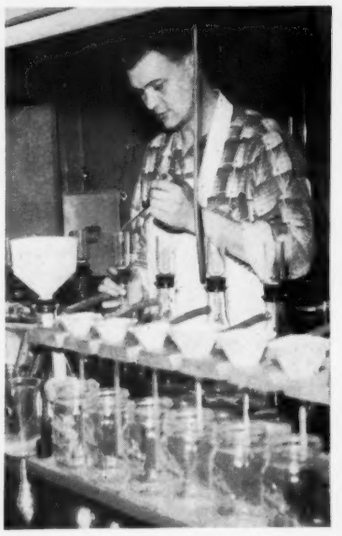
BAGGING FACILITIES—Smith-Douglass plant at Albert Lea, Minn., points with pride to its I&C packaging equipment shown above.

Like charity, which is said to begin at home, the men who work in the plant are given a stimulus to keep things clean by having a neat dressing room in their own employees' building. Unusual efforts are made to keep this place not only neat looking, but also sanitary and comfortable in both winter and summer. The dressing room has no lockers, but the men's working clothes are put on hangers which are hoisted up near the high ceiling over the heads of the men. Ropes and pulleys enable the men to raise or lower the hangers. The neatly painted area helps employee morale, the plant manager says.

Refreshments in the form of soft drinks and milk are furnished through vending machines, but milk is said to be the favorite beverage of most of the men. On the average, the 50 men employed at the Smith-Douglass plant consume about 100 pints of milk each working day.

From the viewpoint of the average citizen of the city of Albert Lea, the fertilizer plant is regarded as an asset. The buildings of the plant are all painted in various colors, the large grassy lawn is not only lush and well-

Turn to PLANT page 28



QUALITY LABORATORY — R. R. Yeager, S-D chemist, keeps constant check on plant food products made at the Albert Lea plant to be positive all grades check out analytically before the fertilizer is bagged. Laboratory is regarded as important part of S-D production program.

BIG NEWS IN FERTILIZER PACKAGING:

researched by Chippewa

Store outdoors, load or unload in any weather, with new, moisture-proof polyethylene bags!

Outdoor storage means year-round production without costly warehousing . . . means the farmer can dump-store fertilizer in his fields. This prime advantage of moisture proof heavy duty 100% polyethylene bags perfected by Chippewa is backed by many others. The material is transparent—a great merchandising aid in the farm feed store. The bags are lightweight, non-bulky, and palletize easily. Punishing impact tests have proved their outstanding toughness. Credit goes both to the polyethylene itself and the exclusive Chipp-a-Weld seal developed by Chippewa—the firm that took an early lead in polyethylene film research, technical know-how, and the development of specialized equipment for quality controlled mass production. Only Chippewa can offer the necessary techniques, formulations, and closures to guarantee satisfaction. Already proved by thousands of tons of shipments, only Chippewa can offer a fully field-tested heavy duty 100% polyethylene bag. Inquiries from major users are invited. For further information, contact:

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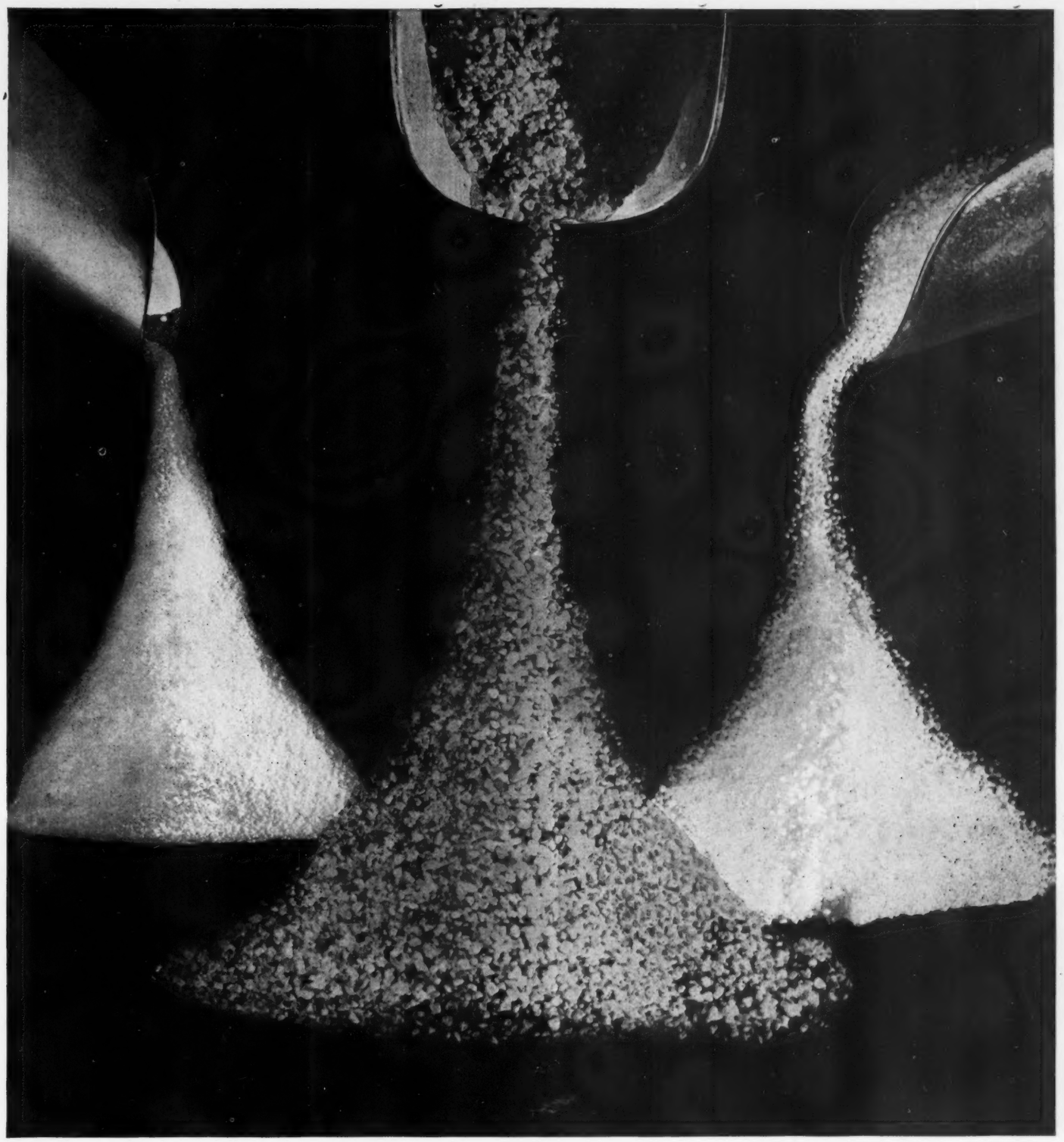
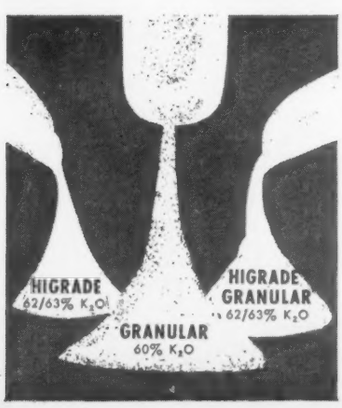


Better fertilizers begin with three grades of free-flowing USP potash



USP offers *three* outstanding grades of potash to meet the most exacting requirements of modern fertilizer production: two white grades—Higrade muriate and Higrade Granular muriate—each containing 62/63% K_2O give you more potash per ton than any other type of muriate. And USP's Granular muriate, containing 60% K_2O, is preferred where a still larger particle size is required.

All three grades are specially refined to remain free-flowing and resist caking for easier handling, manufacture and application.

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Arizona Fertilizers . . . *features modern production equipment*

Phoenix Firm Claims Many 'Firsts' in Making Both Fertilizers and Pesticide Products . . .

SOME TWENTY NINE years ago this month, a farsighted Phoenix man started out to make a few bucks and ended up by making history. Guessing correctly that "farming is here to stay" and that Arizona's farmers would buy a certain plant food product, this man invested in a horse and wagon, hired a helper, and went into business.

With this step began the state's first fertilizer business. The basic materials for his business came from various barnyards. Aptly enough, the firm was named "Arizona Natural Products Co."

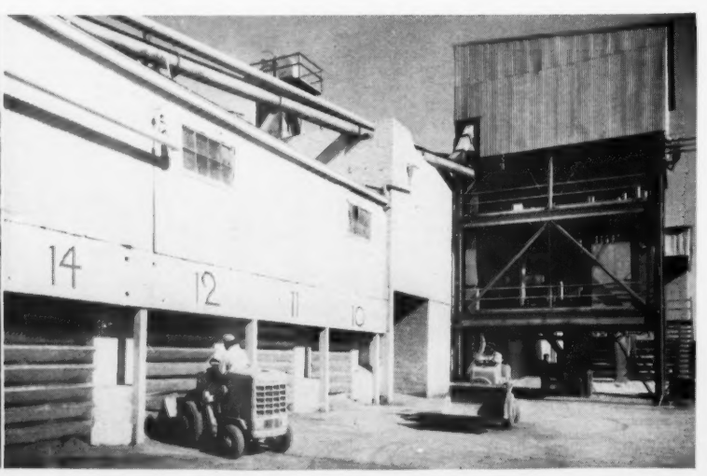
That was in 1930. Today, the business that started out as a one-horse enterprise has a new name and a greatly altered appearance. Like the agricultural industry, it has served for more than a quarter-century. Arizona Fertilizers, Inc., has grown steadily and soundly over the years.

Behind this growth—unusual even for Arizona—is a story of hard work, vision, faith in this state's economic future. Most of all, it's a story of two men—a former Illinois insurance agent and a one-time professor at the University of Arizona.

Frank M. Feffer, Sr., the ex-insurance man, joined the firm in 1935, a year after it had been purchased by his father, J. A. Feffer. Frank, now president and chairman of the board, has spark-plugged the operation ever since.

In 1939, M. F. (Mac) Wharton, Sr., gave up his job of associate professor of horticulture at the university to join Mr. Feffer in the enterprise.

In its first year, the company's payroll was nothing to talk about. Five years later, it added up to only $6,000 a year. Today, this payroll rides above the $500,000 mark.



Instead of one horse and wagon, Arizona Fertilizers' equipment today consists of four huge plants, in Phoenix, Yuma, Toltec and Willcox, plus an impressive array of modern machinery, vehicles, office buildings and laboratories.

Arizona Fertilizers, Inc., broadens its coverage with three wholly owned subsidiaries. Farm Chemicals Co. handles and produces liquid fertilizers and defoliants for wholesale sales only. Plant Protection Co.'s function is to treat seeds with insecticides and fungicides. The production and sales of industrial chemicals are handled by Cortez Chemicals.

It now has approximately 125 employees, including a large staff of college-trained field representatives.

In the old days, Arizona not only had no fertilizer businesses, neither did it have any firms engaged in the making or processing of insecticides, otherwise known as economic poisons.

Arizona Fertilizers branched out into the insecticide business, which now accounts for a large share of its operation. The firm's insecticide dust-blending plant, also the state's first, was built in 1939.

For quite a while, the company had the entire state all to itself so far as fertilizers were concerned, and later enjoyed the same status in insecticides. But those days are gone. There are now 71 fertilizer firms doing business in Arizona, and another 132 which list themselves as manufacturers or processors of economic poisons.

But despite the current competition, Feffer and Wharton can look back with pride on an amazing number of firsts in their type of business. They are, for example, the first in Arizona to label contents of bags of fertilizer; the first to provide balanced fertilizer; the first to manufacture technical concentrates; the first to require college degrees for all fieldmen; the first to provide radio service to fieldmen; the first to provide laboratory service, and the first to put into fertilizer products minor elements such as zinc, manganese and iron.

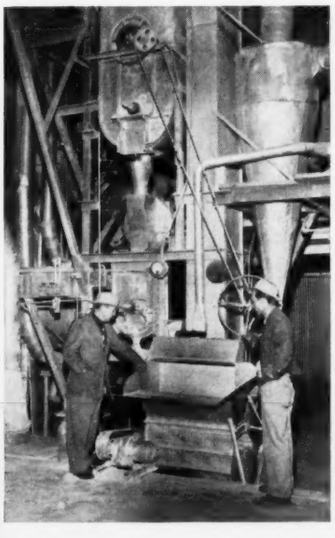
Insistence on technical know-how has always been a policy of Arizona Fertilizers. The firm's fieldmen always keep abreast of latest developments on the scientific front. A $50,000 laboratory, staffed with three chemists and assistants, is always at the disposal of the fieldmen for research or for the solving of special problems. An entomologist, a pathologist and an application engineer all assist the field representatives in doing a better job for Arizona's farming industry.

Arizona Fertilizers has proved beyond question that farms can be expanded without adding an acre, through the proper use of fertilizers, insecticides and herbicides.

Messrs. Feffer and Wharton not only have done their best to insure the future of Arizona agriculture, but they have also taken steps to insure the future of their own company. Frank Feffer, Jr., is vice president and Ted Swift and Joe Hartsig are executive assistants. These men are now being groomed for top posts.

Ben Fehrman, for years one of the company's leading fieldmen and recognized by many farmers as an authority on field problems, is now the firm's sales manager. He coordinates the work of fieldmen with both research and sales departments, developing new ideas and methods which help Arizona farmers maintain top productivity.

AT PHOENIX PLANT—Modern production facilities for making both fertilizers and pesticides are operated by Arizona Fertilizers, Inc. At left, top, is the control panel on one of the technical processing units at the firm's Toltec, Ariz., plant. W. F. Wharton, secretary-treasurer of the firm, checks controls. Center photo, page 6, shows F. M. Feffer, president, at left and Mr. Wharton. Lower panel at left is over-all view of Phoenix home office and plant. At right is exterior view of fertilizer mill at Phoenix. This plant has a 20-ton an hour capacity and all mixed fertilizers are made up on order. Below, Mr. Wharton and Alvin Van Kirk, plant superintendent, check over one of six dust blenders in the insecticides-producing plant.



Introduces Fertilizer

MISSION, TEXAS — Hayes-Sammons Chemical Co., Mission, has introduced a new spray-fertilizer, called Fol-Tron, under the firm's Mission Brand label, announced Claborne B. Brazeal, vice president.

Mr. Brazeal said one of the advantages of the fertilizer is that in diluted form it can be sprayed by plane or by conventional spray rig.

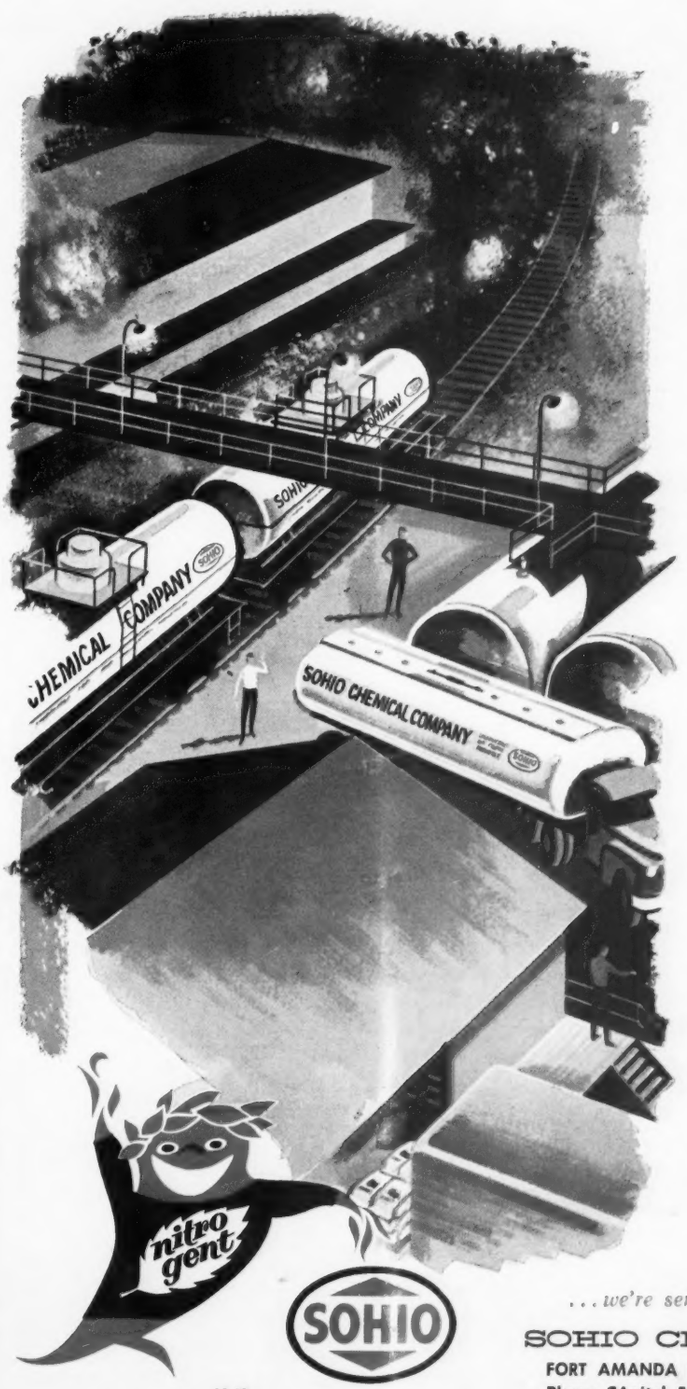
It can be mixed with any standard insecticide, he said.

Bids Accepted for Potash Withdrawals

REGINA, SASKATCHEWAN—The Saskatchewan government accepted $5,483 in a closed bid sale of potash subsurface mineral withdrawals.

Alwinsal Potash of Canada, Ltd., Regina, bid $3,150 on a 98,440 acre area and Southwest Potash Corp., New York, bid $2,333 for a 93,351 acre area.

For 1960 . . . and beyond



fertilizer industry goals rate priority planning at SOHIO

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- Improvements in fertilizer technology and a better understanding of new developments in manufacturing processes.
- Advances in chemical control methods to match continuing dynamic changes in the fertilizer industry.
- Educational and public relations programs that benefit both the fertilizer industry and agriculture.
- Encouraging research in soil science, agronomy, fertilizer economics and related fields.

These goals have always rated priority planning at Sohio. We feel that gearing our programs to match the needs of the fertilizer manufacturers has been a big factor in our growth and expansion.

And it's the reason we will continue to give priority planning to the development of improved nitrogen products, services and activities that will benefit fertilizer manufacturers . . . and the entire industry . . . today and in the future.

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13-59

Control Data Needed for Efficient Operation of Granulation Production

By Rodger C. Smith*
Eastern States Farmers Exchange
West Springfield, Mass.

As we know, tremendous advances are being made by the process industries in the use of control data and the application of instrumentation. The two primary advantages gained are reduced labor costs or increased labor productivity and improved product quality, both extremely important.

Ways have been found in the fertilizer industry to effectively use certain control data but only limited progress has been made in the utilization of instrumentation. Although there are certain problems including small plant size and physical state of the fertilizer, it is reasonable to expect further application of instrumentation to fertilizer granulation.

In accomplishing control of a granulation process, certain data can be obtained continuously or is available in advance. For the important question of analysis obtained, however, we have the severe disadvantage of elapsed time since we depend largely upon the control laboratory. Study of the practical applications of reliable instruments can have the objective of better product quality and less dependence on the control laboratory with its inherent time lag, as well as the objective of lowering costs.

Now what data should be obtained in the efficient operation of a granulation process. This can vary widely. Let me enumerate what appears to be a middle course approach to the collection and use of data at present.

First, we have the incoming materials on which accurate information on nutrient analysis, moisture and screen analysis is basic. Moisture analysis is wanted for formulation and control of degree of wetness in the mixer. The screen analysis of granules formed is therefore important to know, in addition to appraising the ammoniation capacity of superphosphate.

Feeders and meters require calibration and scales need to be checked. A record of those calibrations leads to better understanding of the instruments' characteristics and may predict needed repair.

If using viscous material such as wet process phosphoric acid or spent sulfuric acid, data is needed on the relation of temperature to flow rate otherwise calibrations have to be made. To the extent that information relating to setting of this equipment can be catalogued for quick reference, time is saved and errors avoided.

Certain daily records are required for inventory purposes which also aid control. Other information can be collected daily which can be useful in the following day's operations or later. These include the number of batches, the total amount of each liquid metered during a day or shift and the dry ingredient feeder revolutions or elapsed time of operation during the day or shift. It is well to know approximately what rate of water addition is used to guide later formulations.

The moisture balance is now a familiar article in granulation plants. These analyses obtained once or more times daily dictate fuel input to the dryer immediately and can guide formulation, air volumes required for dryer and cooler and the need for use of coating agents. An over-all evaluation of the daily operation by the foreman or superintendent is very useful in spotting troublesome process or equipment operation and in enabling week-to-week appraisal of operation.

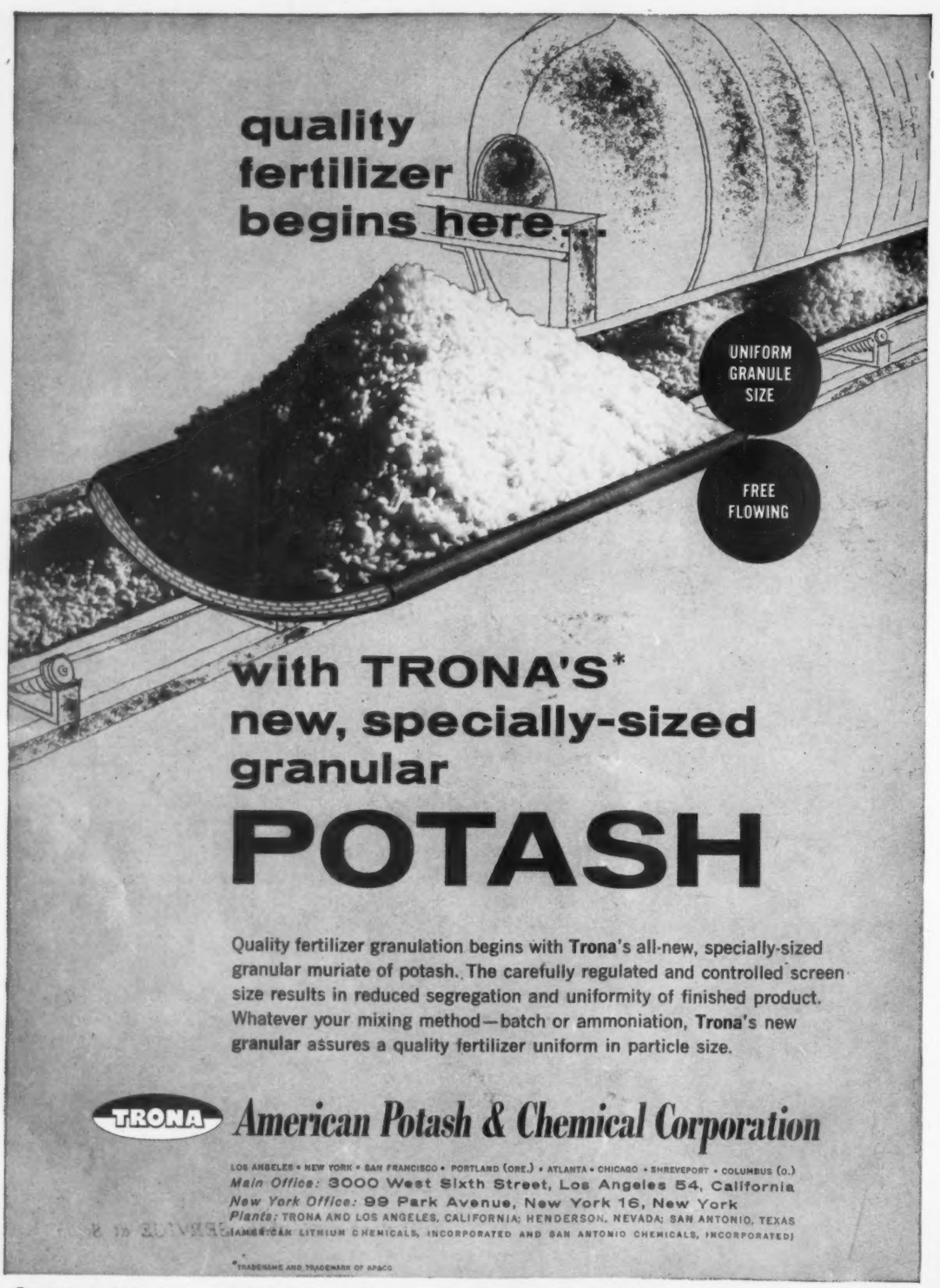
Temperatures are very important. Unless personnel has considerable experience with granulation, the installation of equipment to record continuously temperatures at key locations can lead to more rapid understanding of the process and better efficiency. Typical locations for thermocouples used with a six-point potentiometer are the fertilizer as discharged from the ammoniator, the dryer and the cooler and the air ambient, ex-dryer and ex-cooler.

The ex-dryer air temperature is of particular value to controlling agglomeration and water removal. Some installations automatically control the dryer burner from the ex-dryer air temperature. Now that nitrogen solutions with lower ammonia content and higher salting out temperature are being used, a dial thermometer installed in the nitrogen solution line near the meter is useful. Likewise, one in the acid line is important if calculating viscosity.

The routine product sampling normally includes a composite obtained following classification en route to storage bin. As yet the analyses of these composite mixing samples are of utmost importance to formulation, check of human and mechanical competence and evaluation of process equipment. Information useful on these reports includes date of sampling, laboratory sample number, the bin in which the mixture is stored and the tons mixed. Analytical data on the report normally includes total nitrogen, total phosphoric acid, available phosphoric acid, potash and, on occasion, screen analysis.

This is data which can be used effectively in controlling a granulation process. Additional data should be obtained if the means of obtaining the data and its utilization justify it.

*From discussions at Fertilizer Industry Round Table, 1958.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What's New?

Additional information is available about new products, new services, and literature described in this department. Circle the numbers of items on which you desire more information, fill in your name, your job title, your company's name and address on the card. Then clip it out of the page and mail. No postage is necessary.

No. 9084—Fertilizer Manufacturing Handbook

A publication covering all phases of mixed fertilizer manufacture, including both granular and non-granular products, has been issued by

Spencer Chemical Co. The 125-page book is the third in a series of "Spensol" books published by the company for use by mixed fertilizer manufacturers. Sections of the book include one on non-granular production, dealing with ammoniation, reversion and mechanical condition, formulation, conditioners and fillers.

The section on granulation includes information on conditions for granulation, formulation control, equipment needed, raw material particle size, steam, phosphoric acid, production rates, plant food losses, and formula calculations and tables. Safety suggestions are also included as are instructions for first aid.

Information is also presented on the chemistry of ammoniation, chemical reactions, ammoniation of phosphoric acid, triple superphosphate and normal superphosphate. The booklet is available by checking No. 9084 on the coupon and mailing to this publication.

No. 9075—Polyethylene Spreader-Sticker

General Chemical Division, Allied Chemical Corp., has introduced a new liquid spreader-sticker made with polyethylene, said to give agricultural pesticide sprays unusual spreading and sticking properties.

The product, marketed under the trade name "Plyac," is claimed by its makers to improve initial and residual effectiveness of insecticide, fungicide, herbicide and other agricultural pest control sprays, thus reducing dosages or number of applications necessary. The makers say the material sticks despite wind or rain. Further, they say, the material is non-oily and mixes well with commonly-used spray materials. Non-ionic, it is also not affected by hard water, does not react readily with other chemicals and is compatible in a wide variety of spray mixtures. For full information on the polyethylene spreader-sticker, check No. 9075 on the coupon.

No. 9076—New Model "Payloader"

Frank G. Hough Co. has announced a new model machine in its line of rubber-tired, four-wheel-drive "Payloaders." According to the makers, this unit has the highest dumping clearance, the longest reach and the most powerful engine of any tractor-shovel of its size and capacity range.

Maximum height of raised bucket is 19' 2½", and the forward reach from the front tire is 3' 6". The new machine is powered by a turbo-charged Cummins diesel engine developing 300 h.p.

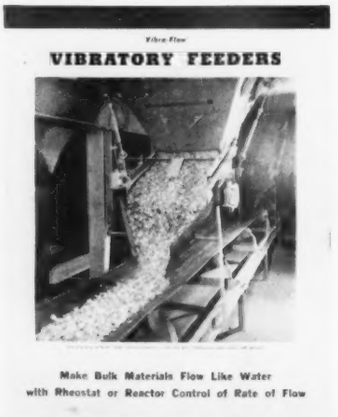
Carry capacity, according to the manufacturer's recommendations, is rated at 12,000 lb. Buckets from 3 to 6 cu. yd. are available. The new Payloader, designated as the H-120, features a four-speed, forward and reverse, power shift transmission. Maximum safety for the operator has been provided, with all moving members being placed out of his way. Complete information on the H-120 is available by checking No. 9076 on the coupon.

No. 9073—Scale

Thayer Scale Co. has information on its new filling scale designed to handle chemicals with highly flushing characteristics. One model, designated as the N18R is said to be a fully automatic net weight packer with a speed of six-100 lb. bags a minute and a capacity of 25-600 lb. It is available with single or double stage rotary feeders, the makers state. For further information check No. 9073 on the coupon.

No. 9078—Vibratory Feeder Catalog

A 32-page catalog describing its complete line of vibratory feeders suitable for use in fertilizer plants,



has been issued by the Syntron Company. Schematic drawings, photographs, specification charts and numerous installations are pictured in the booklet. All types of variable control feeders for handling bulk materials are described in detail, with specification charts and other data being shown. The catalog is available by checking No. 9078 on the coupon and mailing.

No. 9074—Fork Trucks

Clark Equipment Co. has broadened its line to include five new models of fork trucks with standard transmissions and clutches instead of the automatic type. Descriptive material is available on three cushion-tire models of 3,000, 4,000 and 5,000 lb. capacity and two pneumatic-tire machines of 4,000 and 5,000 lb. Full details on these models is available by checking No. 9074 on the coupon.

No. 9077—Dust Sticker

A complete descriptive bulletin on its CP-5 dust sticker has been issued by Colloidal Products Corp. Addressed to pesticide formulators, the bulletin presents data on physical properties of the product, results of tests and experiments with pesticides made with it and descriptions of formulations used on various crops. Charts and tables are included in the data from Florida, Oregon and Washington, Arizona and North Dakota to show the performance of various formulations. The bulletin is available by checking No. 9077 on the coupon and mailing it.

No. 9080—Bag Sewing Machine

Information on its new Model LS-100 sewing machine and adjustable conveyor device is available from Minneapolis Sewing Machine Co. in a new bulletin. Features of the equipment as described in the bulletin include an all-metal slat-type convey-

or belt; conveyor and sewing head may be regulated to the correct position for the operator's size and the height of the bag being filled; conveyor may be raised or lowered simply to accommodate sizes ranging from 5-lb. sample bags to 200-lb. bags.

A heavy-duty sewing head is standard equipment, the makers say. This equipment can sew paper, cotton and burlap bags without adjustments. Other optional equipment is described in the bulletin which is available by checking No. 9080 on the coupon and mailing.

No. 9083—Electronic Selecting Scale

A new model electronic selecting scale has been developed by Cunningham Electronic Selecting Scales Co. for installation in a manufacturer's production line. The device is a conveyor-type of electronically-controlled weighing scales. It weighs items that have been bagged, and those under or over the predetermined weight are automatically rejected onto respective conveyors. Fertilizer manufacturers find this device of particular value, according to the makers. Model 59, in the illustration, accepts

Send me information on the items marked:

- ☐ No. 9073—Scale
- ☐ No. 9074—Fork Trucks
- ☐ No. 9075—Polyethylene Spreader-Sticker
- ☐ No. 9076—New Model "Payloader"
- ☐ No. 9077—Dust Sticker
- ☐ No. 9078—Vibratory Feeder Catalog
- ☐ No. 9080—Bag Sewing Machine
- ☐ No. 9081—Lead Stabilizer Attachment
- ☐ No. 9082—Plastic Faucet
- ☐ No. 9083—Electronic Selecting Scale
- ☐ No. 9084—Fertilizer Manufacturing Handbook
- ☐ No. 9085—Pump Catalog
- ☐ No. 9086—Dust Sampler
- ☐ No. 9087—Equipment Catalog

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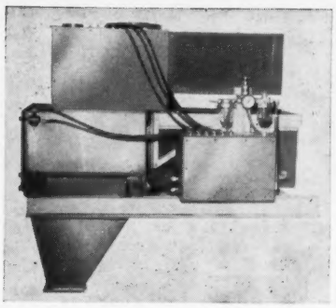
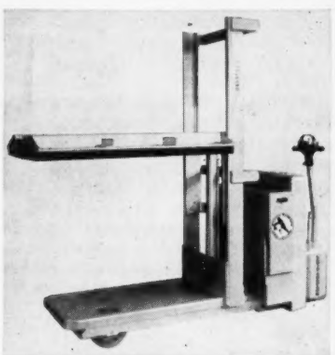


bagged or packaged units from 25 to 200 lb. The machine's capacity is 1,440 units an hour. Allowable tolerances are adjustable to U.S. and state weights and measures specifications, the makers claim. Further information is available. Check No. 9083 on the coupon and mail.

No. 9081—Load Stabilizer Attachment

A load stabilizer attachment designed primarily for handling loads of bags or other unstable materials which have a tendency to ride off skids or pallets, has been developed by Lewis-Shepard Products, Inc. The stabilizer is hydraulically operated from the operating handle and clamps down on top of the load as illustrated.

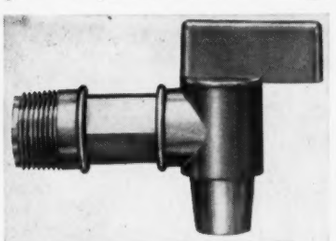


Various clamping heights may be furnished to suit the height of the load by the adjustable top clamp arm.

The stabilizer is padded by sponged lined pads which clamp down on any material and hold it firmly in place while the load is being transported, according to the manufacturers. This feature is said to be particularly practical when slanted ramps are encountered. Complete information is available by checking No. 9081 on the coupon and mailing.

No. 9082—Plastic Faucet

A smooth-flow plastic faucet constructed from a new type of lightweight polyethylene is offered by Multi-Meter Corp. Information on the item indicated that it fits all standard ¾" drum openings and is quick in operation with no leakage



at threads or valve. According to the makers, the polyethylene faucet does not react with chemical products and will not stress-crack nor break. Further information is available by checking No. 9082 on the coupon and mailing to this publication.

No. 9085—Pump Catalog

A new catalog describing its pump line for the chemical industry has been issued by Dorr-Oliver, Inc. Containing 22 pages, the catalog describes its line in wash drawings, pen-and-ink schematic drawings, photographs, specification and performance data and parts lists. The pumps include three different designs, the makers say. These include an alloy metal centrifugal; a lined centrifugal and the diaphragm slurry.

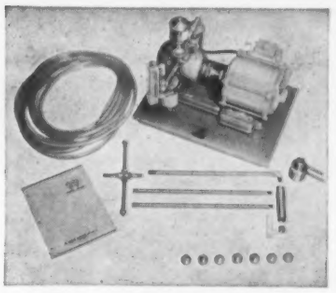
The catalog is available by checking No. 9085 on the coupon and mailing to this publication.

No. 9087—Equipment Catalog

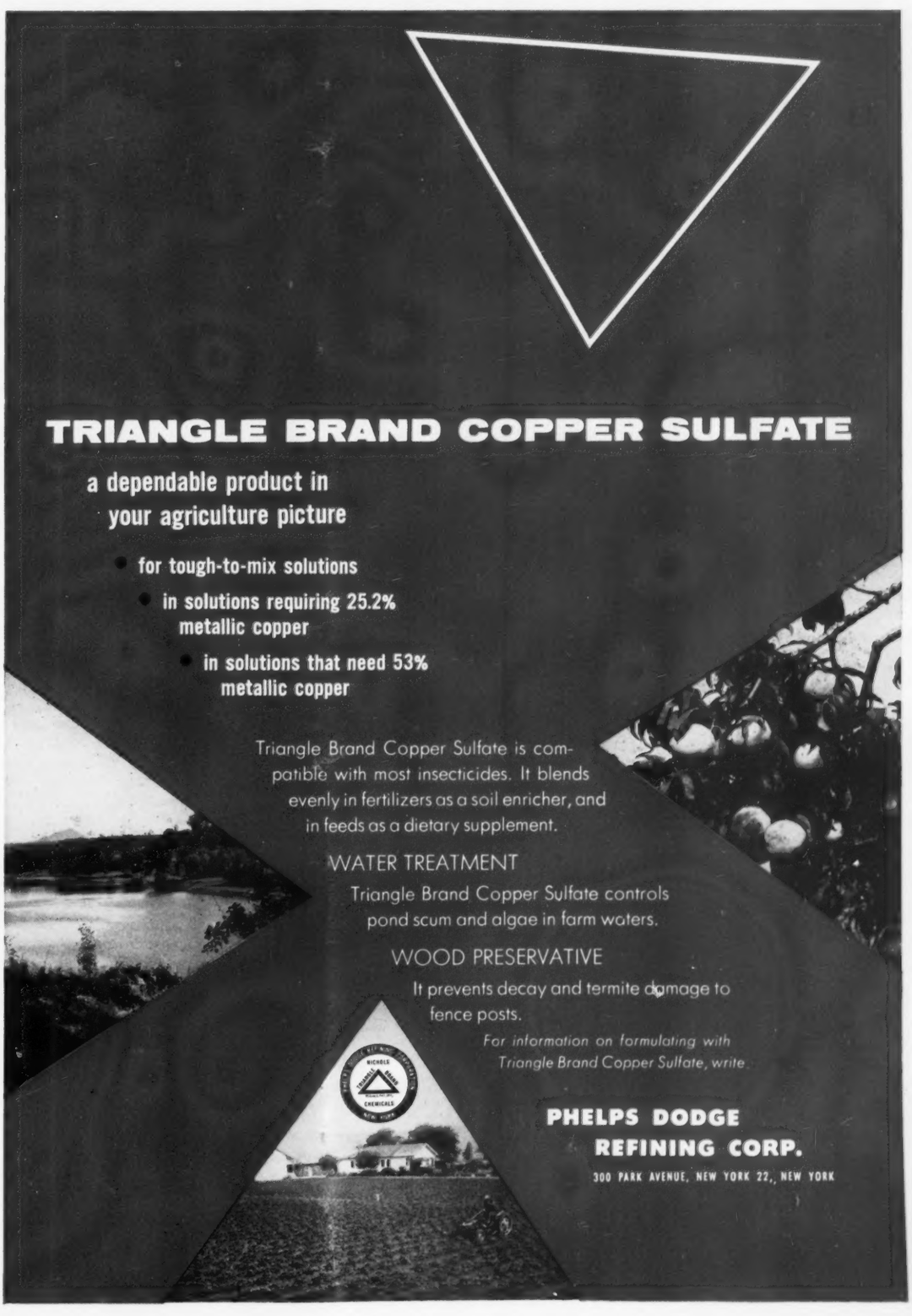
A condensed catalog of materials handling equipment, parts handling equipment, power rectification equipment, mechanical shaft seals, paper joggers and portable construction tools has been made available by Syntron Co. Included is information about the company's vibrators, car shakers, car rappers, packers and jolters, hopper level switches, flow control valves, feeders, conveyors, spiral elevators, dry feeder and weigh-feeding equipment, grizzly bar screens, screening feeders, vibrating screens, test sieve shakers, parts feeders, lapping machines, rectifiers and rectifier units, battery chargers and other equipment. The catalog has 68 pages. For copies check No. 9087 on the coupon and mail.

No. 9086—Dust Sampler

The Iso-Kinetic Dust Sampler, designed to measure dust particles discharged from dust control equipment and to determine equipment operating efficiency, has been introduced by the Day Co. The sampler will accurately measure grains of dust passing through dust control ducts, or will measure particles being discharged from dust control equipment, such as



cyclones or other equipment which exhaust to the atmosphere, the company says. The complete unit consists of a rotometer, air-line filter, air pump, oil reservoir, oil trap, electric motor, plastic air-line tubing, rod handle, graduated rod, filter thimbles, thimble holder, thimble ring seals and nozzles. It comes complete with instructions and charts. Check No. 9086 and mail.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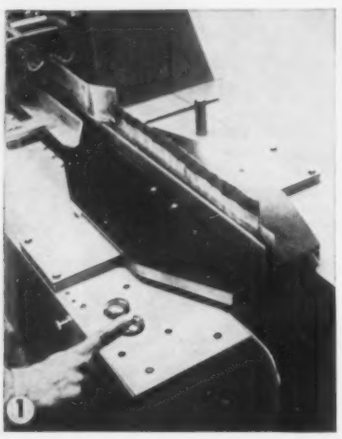
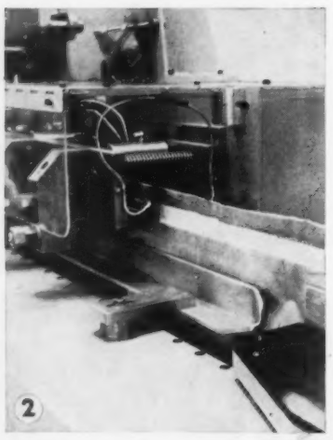
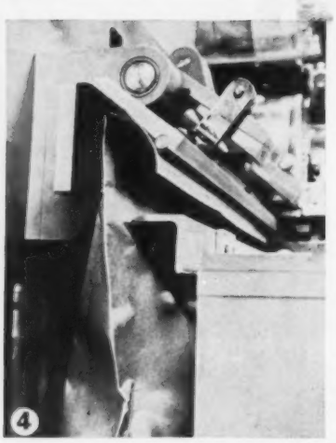






HOW BAGGING SEAL WORKS—After forming the bag top, operator presses the button to activate machine. (Picture 1) Two plates move on horizontal plane against both sides of bag, evacuating air from above bag's fill line and also serve to hold formed bag top in correct position. The bag then enters between heat-sealing bars. (Picture 2) When bag is in correct position, the bars press against the inner ply. After heat sealing, adhesive is applied to the inside of the outer plies as the bag moves to next station. Tape is then applied to outside of outer plies. (Picture 3) The pasted and taped lip of bag is finally folded over and pressed against the face of the bag, completing the closure. (Picture 4)

A COMPLETE heat-sealed, liquid and air-tight package said to eliminate the problem of excessive moisture pickup by bagged fertilizer products or other hygroscopic material has been developed by Union Bag-Camp Paper Corp. Shown recently at the National Packaging Exposition in Chicago, the new type unit was designed expressly to package many types of hygroscopic, deliquescent, corrosive, or semi-liquid products.

The multi-wall paper bag used in the packaging process is sold under the trade name of "Uniseal" and is used in combination with a special closing machine also developed by the company.

According to Union Bag-Camp, the bag is designed to hold up to 100 lb. of bulk product and is constructed in the form of a tube of from two to six plies of paper. The inner ply is coated with polyethylene or other heat sealable material, depending upon the product being packaged.

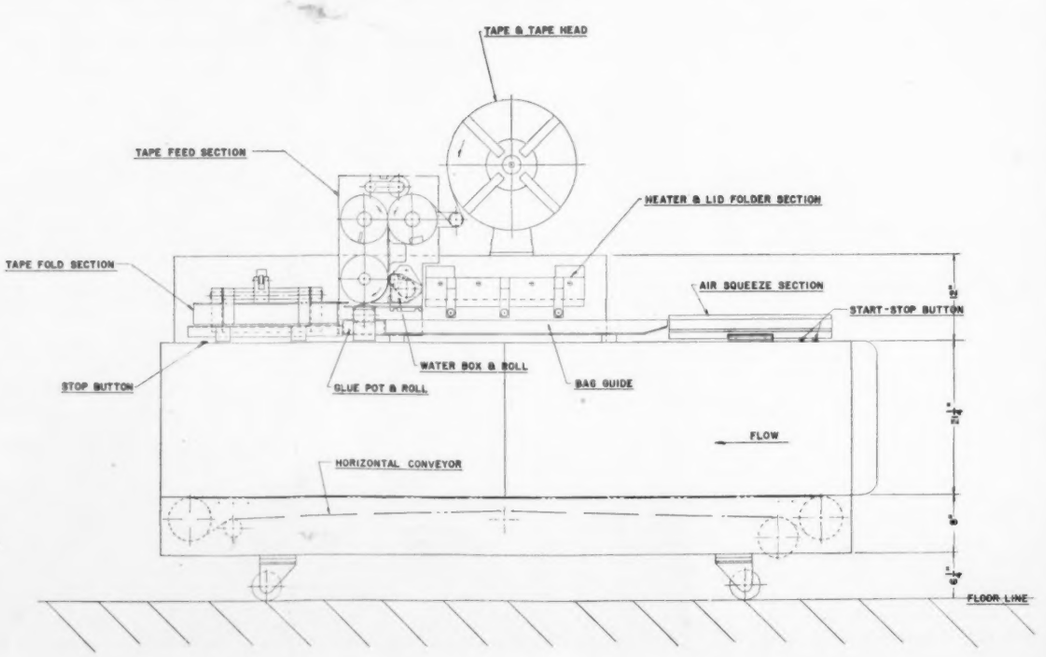
The makers state that the new packaging development features offset or staggered outer plies of the bag, leaving the inner ply exposed to take a direct heat seal application. "Previously, it was impractical to heat seal the inner ply of a multiwall bag since the seal had to be applied through all the paper plies," a company spokesman explained. He added that these outside plies acted as an insulating barrier, preventing heat sealing at acceptable commercial speeds.

> The vertical seam and the bottom of the inner ply are heat sealed by the bag manufacturer, but the top of the inner ply is heat sealed by the bag user after the bag is filled. After heat sealing the top of the inner ply, the closing machine then applies adhesive to the tops of the outer plies. The entire lip is then folded over and pasted to the outside of the bag so that no pressure is exerted on the heat seal itself.

Simultaneously, the machine adds a strip of 2½" width gummed tape, centered over the edge of the lip. The customer closure effected by this machine is duplicated by the factory closure on the bottom of the bag. The machine heat seals, pastes the lips and applies gummed tape at the rate of six filled bags a minute. Other models of this machine are now being designed to increase bag closing speeds, the makers state.

Economy claims made for the new bagging arrangement indicate that "substantial savings" may be made on container costs, as well as on storage and shipping space. Further savings may be realized by the manufacturer because of the difference in tare weight between multiwall bags and other types of containers, the company says.

Union Bag-Camp has registered the "Uniseal" trademark in the U.S. Patent Office and patent applications have been filed covering both the bag and the sealing equipment.



CLOSING MACHINE—At right is schematic drawing of the special closing machine for use with the "Uniseal" bag to reduce problems attendant with packaging of hygroscopic materials.

QUESTIONS—ANSWERS

From You — From Experts

Question: "My maintenance problem is ROOFING. Our fertilizer buildings have 5-ply felt and asphalt roof coverings and we apply periodic 'hot' coatings. Would like to know what other fertilizer firms are doing and the results they get."—New York superintendent.

Answer: What IS the answer to this superintendent's problem? Since it is not a question having to do directly with fertilizer manufacturing, none of our technical experts are the appropriate ones to ask.

However, we feel that there must be additional superintendents and other fertilizer production people who have experienced and solved similar problems. How about dropping a card or letter to us giving your own reply? We'll pass it along to the inquirer. Address Croplife Editor, Box 67, Minneapolis 40, Minn. Thanks.

Question: "My production problems are two-fold: 1. Ammonia (nitrogen) losses and 2. Dust losses. What can we do about these losses?"—Ed Gibson, production manager, Texas Farm Products Co., Nacogdoches, Texas.

Answer: Dr. G. L. Bridger, director of agricultural chemical research, W. R. Grace & Co., Clarksville, Md., discussed this problem thoroughly in a discussion at a recent fertilizer industry Round Table. "Under certain conditions, nitrogen may be lost in mixed fertilizer production in the ammoniation step, the drying step and possibly the storage period," he said.

Ammoniation Step

"In the ammoniation step the problem is to get as much free ammonia as possible combined with the superphosphates used in the formulation without excessive loss of nitrogen or excessive P_2O_5 reversion, since any free ammonia not absorbed by superphosphates requires addition of sulfuric or phosphoric acid for its neutralization. The free ammonia may be added as anhydrous ammonia or as a constituent of a nitrogen solution.

"The factors controlling absorption of ammonia are the chemical and physical properties of the superphosphates used, the ammoniation rate, the time and temperature provided for the chemical reactions, and the distribution and mixing system for providing intimate contact between anhydrous ammonia, nitrogen solution, acid and solid ingredients.

"Physical properties of both normal and triple superphosphates are generally more important than chemical properties with respect to their ammoniation characteristics. Superphosphates consist principally of monocalcium phosphate monohydrate with a small proportion of free phosphoric acid and a considerable proportion of calcium sulphate in the case of normal superphosphate.The properties of superphosphate that are most important are particle size, moisture content and porosity."

Studies have shown that only the minus 80 mesh fraction of both normal and triple superphosphate absorbed ammonia completely when the usual ammoniation rates were used (4 lb. of NH_3 per unit of available P_2O_5 for triple superphosphates and 6 lb. NH_3 per unit of available P_2O_5 for normal superphosphate).

As the particle size increased from 80 mesh to 4 mesh, the percentage absorption decreased to about 60% for normal superphosphate and 80% for triple superphosphate. In plant operation it is of course impractical to screen superphosphates to minus 80 mesh before use, but these results point to the desirability of keeping the particle size as small as practical with the equipment at hand.

The moisture content of normal or triple superphosphate should be at least 6% for good ammonia absorption. The above studies showed that superphosphates that will absorb 95% of the ammonia at 6% moisture will absorb only 90% at 4% moisture and 80% at 2% moisture.

The porosity of the superphosphate is a most important property, but there is no quantitative way in which its effect can be measured except an actual ammoniation test. I am referring primarily to the microcrystalline porosity rather than the space between individual particles of superphosphate. Superphosphates may differ considerably in porosity depending on their method of manufacture. Some artificially dried superphosphates are less porous than storage cured products.

Ammoniation Rate

Ammoniation rate, or the ratio of ammonia to the available P_2O_5 content of the superphosphate, is one of the most important factors in ammonia absorption. If too much ammonia is used, much of it is simply not absorbed and goes up the stack, and furthermore reversion of the available P_2O_5 to an insoluble form may take place. Widely accepted ammoniation rates in the industry are 4 lb. NH_3 per unit of available P_2O_5 for triple superphosphate and 6 lb. NH_3 per unit of available P_2O_5 for normal superphosphate. With these rates at least 95% recovery of the ammonia can be expected if all conditions are favorable.

Time of Reaction

Sufficient time must be provided for the free ammonia to contact the superphosphate and be absorbed throughout the mass. More time must be provided for high ammoniation

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rates than for low ammoniation rates. At the commonly used rates mentioned above, a reaction time of about three minutes is necessary. This will depend somewhat on the type of equipment in which the reaction takes place and whether ammoniation is done batchwise or continuously.

Reaction temperature is not as important as some of the other factors and has relatively little influence on absorption of ammonia by normal superphosphate over a temperature range of 122-190° F. Higher temperatures favor ammonia absorption by triple superphosphate over a range of 149-216° F.

Distribution and Mixing

It is very important that the anhydrous ammonia, nitrogen solution and acid be added as uniformly as possible throughout the bed of materials in the mixer and that the mixing be as good as possible. The means to accomplish this are varied depending upon the equipment used and whether the system is batch or continuous.

It is obvious that without good distribution there will be a tendency for over-ammoniation and consequent loss of ammonia in localized areas, and under-ammoniation in other areas. Furthermore poor distribution contributes to over-granulation and lump formation because of excessive moisture and temperature in localized areas. A more serious consequence of poor distribution is formation of ammonium chloride fume due to localized excess of acid; this attacks potassium chloride forming hydrogen chloride vapor, which forms ammonium chloride fume upon reaction with ammonia vapor.

Temperature

The most important factor governing nitrogen loss in the dryer is temperature to which the product is heated. Nitrogen compounds are relatively unstable at moderate temperatures; for example, di-ammonium phosphate begins to lose appreciable amounts of nitrogen at about 200° F. Other nitrogen compounds are more stable but all have an appreciable vapor pressure of ammonia at temperatures which may be encountered in fertilizer processes.

In the studies at Iowa State College it was found that appreciable nitrogen losses occurred in some cases at product temperatures as low as 150° F. Nitrogen losses as high as 20% were found to occur at product temperatures in the range of 250-300° F. and with inlet air temperatures in the range of 400-600° F.

These high losses were for fertilizers made from ammoniation of normal superphosphate at a rate of 5.4 lb. ammonia per unit of available P_2O_5 and with a dryer retention time of about twenty minutes.

The loss of nitrogen caused by overheating can be easily demonstrated in the laboratory by heating samples of fertilizer to various temperatures. Depending on their composition, fume evolution will generally be observed in the temperature range 300 to 500° F.

Time

The nitrogen loss increases gradually with increasing dryer retention time so that conditions should be such as to achieve the desired degree of drying in the minimum time possible.

Rate of Ammoniation

Nitrogen loss on drying increases as the rate of ammoniation is increased, since diammonium phosphate is more easily decomposed than monoammonium phosphate. If therefore ammoniation is high enough to form diammonium phosphate, nitrogen losses on drying are more likely.

Storage Step

Nitrogen loss in storage of mixed fertilizers does not occur except under very unusual conditions. In high-nitrogen grades, it is possible that decomposition of nitrogen compounds may occur if localized overheating is permitted, in which case the decomposition may spread and a serious fire result. If alkaline materials such as lime are mixed with the fertilizer, liberation of ammonia will take place.

Dust Control

Dust control is a continuing problem in the fertilizer industry. Many plants, faced with substantial losses from escaping dust, plus the nuisance and plant health hazard considerations, have succeeded in licking the problem through installation of various types of collectors.

This questioner would be interested in recalling some of the steps taken by other manufacturers who were faced with similar problems. The following examples were cited by C. A. Hoffman, Wheelabrator Corp., at the 1958 "Round Table":

"A fertilizer company in Iowa installed a cloth bag type dust collector for collection of dust from a granular fertilizer dryer operation. The dust collector collects approximately 1,800 lb. an hour and this reclaimed material has a normal value of $50 to $60 a ton.

"The particle size of dust collected by the cloth bag-type dust collector on this fertilizer dryer application is such that 98.5% passes through 100 mesh (approximately 147 microns) and 82.1% passes through 325 mesh (approximately 43 microns). The amount of particles passing through 325 mesh indicates a large percentage of particles in the small micron range.

"This same company has two cloth collectors on its bagging and bulk loading stations, installed in early 1956. One of these handles 10,000 c.f.m., the other 13,000. Their installed cost was approximately $14,000. Significantly, they collect 2% of the total of all material sent to the bagging and bulk loading stations. All of this material is salvageable.

"In Michigan, another fertilizer company notes that approximately 1,200 lb. of fertilizer an hour is collected by the cloth bag type dust collector on a 35-ton per hour granular fertilizer production unit.

"Trap the dust at its source by the installation of an efficient dust collection system and you will also eliminate the problem of air pollution, many times at a profit.

"Remember, too, the sphere of preventive maintenance and operating costs at the dust collector and the dust collector system itself must be kept in an effective operating condition by giving it the same kind of attention as is given to production equipment."

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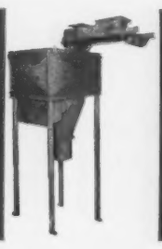

☐ We are interested in improving our bag.
☐ We are interested in your Kraftpacker.

NAME OF COMPANY_____

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PRODUCT MFD._____

Arcadian® News

Volume 4 | For Manufacturers of Mixed Fertilizers | Number 5

How to Extend Your Season and Sell More Tonnage Now

The heavy shipping season for mixed fertilizers is now behind us. But the season is not yet over for alert manufacturers of mixed fertilizers. They will start now to extend their season and increase their total tonnage, by aggressively selling nitrogen materials (liquid and dry) for top-dressing and side-dressing.

Thousands of farmers in your sales territory are now buying nitrogen for supplemental application. It will pay you to make sure that your mixed fertilizer customers buy their supplementary nitrogen from you. It's good business to supply your customers' complete plant food needs.

You strengthen customer loyalty and you get a bigger share of the fertilizer market, when you are prepared to provide all of the mixed goods analyses and straight materials your customers need and want. It pays to establish your prestige and your leadership as a dependable, "full-line" source of supply.

By selling straight nitrogen now, you get many practical benefits: 1) You increase your total sales and profits. 2) You help farmers to get better yields and insure that response to your mixed fertilizers will not be limited by lack of nitrogen. 3) You spread your overhead expense over a bigger tonnage. 4) You keep your sales staff busy. 5) You build farmers into exclusive customers for you and your dealers.

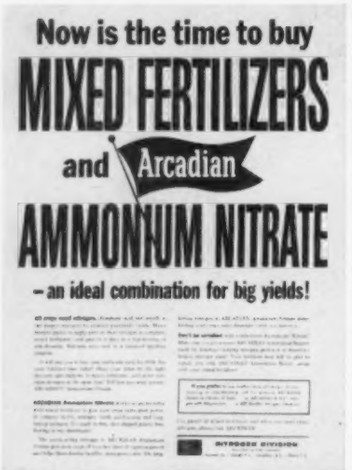
Nitrogen Division, Allied Chemical, sells nitrogen for use in the manufacture of mixed fertilizers and for direct application. Nitrogen Division has always fostered the role of nitrogen in a balanced fertilizer program and has spent millions of dollars to promote the use of mixed fertilizers. Nitrogen Division has also established ARCADIAN® Nitrogen Products as the leading source of supplementary nitrogen for direct application.

(Continued on following page)

(Continued from preceding page)

It will pay you to let Nitrogen Division work with you in helping you to offer your customers a complete line of mixed fertilizers and straight nitrogen materials. Many different ARCADIAN Nitrogen Solutions are available for the manufacture of every mixed fertilizer analysis now in demand. Many different ARCADIAN Nitrogen Products (liquid and dry) are also available for direct application. Powerfully-advertised and promoted, these products are well-known and widely-used by farmers everywhere.

Let Nitrogen Division help you build your volume and your profits. You can extend your season and sell more tonnage right now by contacting the nearest office of Nitrogen Division, Allied Chemical Corporation.



Here is one of the many Nitrogen Division full-page farm magazine advertisements, promoting the use of mixed fertilizers.

Sampling Can Protect You As Well As Your Customer

Far too few samples are taken and analyzed from the average run of mixed fertilizers. Too few samples at the mixer, the dryer, the cooler and the storage pile, that is. Adequate and efficient sampling in the manufacturing process saves you from costly overages and also protects your customer from goods averaging under plant food guarantees. In the long run, a thorough sampling and testing program at your plant will do both you and your customers far more good than any increase in testing by state fertilizer control laboratories.

Sampling at the mixer reveals the degree of perfection in the mixing of dry ingredients as well as the success of desired chemical reactions between ammonia, superphosphates and any acid that has been added. If your nose doesn't detect any smell of ammonia in the air at the mixer, don't let it stop you from taking samples. Ammonia fumes can escape through ducts, either in a continuous or batch mixer, without the operator being aware of the loss by "smell" test. Even when acid is used to capture excess ammonia, you can still lose ammonia through drafts or suction in flues and ducts. The best system is to take samples at the mixer at intervals throughout the discharge cycle, and in proportion to the volume of materials discharged. You may find out some startling things about the operation of your mixer by analyzing these samples separately.

Sampling Should Be Systematic

Sampling from the dryer should reveal any "burning out" of nitrogen during this phase of manufacture. Samples taken from the cooler should reveal any "classification" of the mix by high velocity air that may strip out unequal amounts of different ingredients. Analysis of these samples can help you adjust and improve your methods of granulation. For both granular and semi-granular goods, this careful check on methods may enable you to produce the right quality and

Arcadian

DRY NITROGEN PRODUCTS FOR DIRECT APPLICATION

AMMONIUM NITRATE
Pelleted Nitrogen Fertilizer

UREA 45 Nitrogen Fertilizer
Pelleted Urea Nitrogen

A-N-L® Nitrogen Fertilizer
Nitrogen with Magnesium

AMERICAN NITRATE of SODA
Nitrate Nitrogen and Sodium

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LIQUID NITROGEN PRODUCTS FOR DIRECT APPLICATION

Golden URAN® Nitrogen Solution
Urea, Ammonium and Nitrate Nitrogen

FERAN® Nitrogen Solution
Ammonium and Nitrate Nitrogen

NITRANA® Nitrogen Solution
Nitrate and Ammonia Nitrogen

Anhydrous Ammonia
Concentrated Ammonia Nitrogen

analysis mixture with minimum use of acid.

Thorough sampling from the pile can tell you what chemical reactions occur in the pile, the effects of separation by particle size, and the results of any contaminants in the pile. Samples taken from the first half day's production of large storage piles can often help you make all needed corrections. But good results from the first day's run are not enough. You must maintain these good operating procedures to get economical formulation and correct plant food proportions.

Some critics say that storage pile sampling is not accurate enough to compare with actual bagging and sampling of fertilizer under inspection conditions. Yet many manufacturers get an excellent check on quality, even from the largest storage piles, by systematic sampling. They take regular samples throughout the building of the pile. They collect the samples from random spots from top to bottom of cone piles, and deep enough to reach through any stratification of materials. For best results, they take samples from at least 10 points in any sizeable pile at each sampling, and start sampling early so that they don't miss the core of the storage pile.

Test Samples Promptly

Speedy analysis of your samples pays off. Some manufacturers have been alarmed by belated reports on mixer samples that showed faulty analysis—reports that were completed long after a big storage pile had been built up. You can waste just as much money in your fertilizer mixer with sampling, if you don't check your samples quickly.

Other manufacturers who discover faulty analysis from mixer samples feel relieved when the storage pile samples show a nearly correct analysis. This is fine as a protection for your customers, but it doesn't save you from ammonia losses and other unnecessary expenses caused by poor mixing. Manufacturing fertilizer is a precision business today—if you want to make money. Regular sampling and prompt analysis of samples can help you keep equipment, staff and operating procedures at an efficient level.

The Nitrogen Division, Allied Chemical, technical staff is ready to help you perfect your sampling methods, and also to assist you in developing the best techniques for analyzing the samples and studying the results. Contact Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N. Y.

Don't Make the Same Mistakes Next Season!

To make your next season better, now is the time to correct any problems and difficulties that caused loss of business this spring.

Bottlenecks in production, bagging, loading and shipping facilities should be analyzed while they are fresh in mind. Schedule necessary changes to be carried out during the off-season months ahead.

If you were caught short on raw materials or mixed fertilizer this spring, try to pin down the reasons now. If additional storage is needed, you will want to line it up soon before another rush season. If you were short on raw materials go over your inventory and scheduling procedure on incoming products and try to set up a system which will permit more accurate advance ordering next season.

Note worn parts in your equipment so that they can be replaced during the summer shutdown. Replenish your stock of necessary spare parts. Check your plant personnel and line up indicated replacements, make promotions and give further training where needed.

Go over the formulae you are now using and compare with the laboratory analyses you have been receiving on your mixed fertilizer samples to determine where adjustment should be made to stay closer to guaranteed grade. Also look for formula changes which will help cut costs next year.

Be Sure Your Customer Knows He Is Satisfied!

The surest way to nail down repeat sales next year is to see to it that customers are satisfied with what they bought from you *this* year! Short of making actual yield checks, your best bet for dramatizing response to fertilizer is to point out growth differences.

A little time spent now to point out these growth differences can pay big dividends in customer satisfaction and those vital repeat sales. Then, too, if there should be cases where your fertilizers are *not* showing the expected response, it's important to know about them so that the necessary corrections can be made before next year's selling season. In that regard, always be watchful for evidences of deficiency in secondary and trace minerals, as well as in major plant foods. Remember that the lack of any one of the elements required for plant growth might very well limit the performance of your fertilizer!

HERE'S THE BIG LINE OF Arcadian® NITROGEN SOLUTIONS

When you purchase your nitrogen requirements from Nitrogen Division, Allied Chemical, you have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You are served by America's leading producer of the most complete line of nitrogen products on the market. You get formulation assistance and technical help on manufacturing problems from the Nitrogen Division technical service staff. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions.

	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	15
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.184	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.050	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6C	43.0	20.0	68.0	6.0	6.0	9.3	1.180	12	39
6M	44.0	22.0	66.0	6.0	6.0	10.0	1.158	17	14
10	44.4	24.5	56.0	10.0	9.5	11.0	1.114	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.087	25	- 7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.932	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.978	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	-108

Other ARCADIAN® Products: URAN® and FERAN® Solutions • Ammonia Liquor • N-dure® A-N-L® • Ammonium Nitrate • UREA 45 • Nitrate of Soda • Sulphate of Ammonia

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San Francisco 4, Cal., 235 Montgomery St. Yukon 2-6840

Victor C. Smith

Meeting the Trends in . . . Pesticide Formulation

By Victor C. Smith
Velsicol Chemical Corp.
Chicago, Ill.

SOME OF THE current trends in pesticide formulation techniques are very apparent, while others are more obscure and not so easily noted. Still, the future of the pesticide industry and the prosperity of every one in it is dependent to a large extent on how well these trends are recognized and how well prepared the industry may be to adapt to changing situations. The formulator who is able to recognize these trends and takes steps to meet them ahead of his competitors, has an opportunity to gain considerably, profitwise.

The purpose of this article is to establish the fact that well-defined trends do exist in the pesticide industry; to suggest what some of them may be; and to show how such trends might be met.

Granular Formulations

Probably the best defined recent trend in the pesticide formulating industry has been the switch to granulars. About four years ago the first tumbler blenders were installed. By December, 1958, over thirty-five tumblers were in operation, making granular insecticides. About half of these blenders are standard factory-made units. The rest are either totally or partially custom fabricated or they are locally modified concrete mixers.

During the past two years, formulators' questions have changed from "Do I need a tumbler blender?" to "What is the best type of tumbler blender to install?" At the present state of the art, operating techniques and practices are more important to the quality of product than the type of tumbler blender used (unless the blender is grossly mis-designed). Subsidiary equipment, particularly the spray nozzles and their correct positioning in the blender, plus the rest of the impregnating and the screening apparatus, are extremely important to quality of the product. The type of blender and its installation, however, have an important effect on the production rate.

While the blender design is secondary to formulating techniques, and the best use of subsidiary equipment in effecting the quality of the product, there are several factors in tumbler blender design that make it easier to get a good product. A sufficient depth of granular material in a tumbler blender will provide sufficient weight to rub out some inadvertently-formed agglomerates which otherwise would be separated on the screening machine, thus lowering the yield. If a large quantity of agglomerates is removed the assay of the formulation will be low. Excessive agglomerates are usually caused by:

(1) Incorrect formula for impregnating liquid (insufficient solvent, need for a wetting agent, etc.).

(2) Temperature of impregnating liquid (usually the temperature is too low or the granules are too cold).

(3) Incorrect nozzle placement (spraying on exposed portions of equipment).

Members of the industry have talked about making a continuous operation of granular pesticide formulations, and there is no longer a valid reason why such an operation could not be made successful, now that there is a large and growing demand for granules.

Multi-Use Formulations

There is a growing trend toward dual and multipurpose pesticide formulations. The advent of mixed insecticides with selective herbicides and of mixing fertilizers with such dual-purpose pesticide, is expected to carry the trend to new highs.

The use of mixtures is expected to increase because of the economies involved. The savings in applications cost, the profit available in proprietary brands, and the tendency of multi-purpose pesticides to be prepared for the small package trade, will all act to promote these formulations. A diversified steady demand will make possible off-season formulating of many of these materials and thus create an additional incentive for their preparation. Care must be taken, however, to promote only those uses where all ingredients will be effective as to placement and time of application.

In anticipating equipment needs, the formulator should consider a number of factors. A tumbler blender to formulate granular material, should be designed and installed so that it can be readily and completely cleaned. Dust and vapor protection for the workmen and avoidance of contamination of other materials, must be complete. Explosion proof electrical equipment is required and a completely fireproof installation site is recommended.

Melting tanks, weigh tanks, formulation kettles and impregnation kettles, should be designed to meet the requirements of all of the pesticide chemicals that will be used. At the present time, glass lined and stainless steel are recognized as suitable for handling most pesticide chemicals. It is estimated, that over half of the pesticide formulators use stainless steel. Some nickel, some glass lined and some copper kettles are used. The balance are black iron.

A few aluminum tanks are still in use. While the melting of chlorinated hydrocarbons in aluminum kettles will result in the destruction of the kettle if the temperature is allowed to get too high, solutions of the chlorinated hydrocarbons have been formulated with mild heating in aluminum kettles for many years.

Larger-Sized Granules

In granular materials, there is a definite trend to larger particle sizes. To some extent, it may be that use is ahead of research data which must eventually set the optimum particle size for each application. Little difficulty is expected in changing from a smaller to a larger granular size, however. Different sized screens should, of course, be used and the head on the air flow baggers should be increased or possibly a different type bagger installed.

More Concentration

There is a continuing trend from dilute to concentrated pesticide formulations. Transportation charges, container costs and handling charges all combine to keep formulation strength at a maximum. New application equipment, especially airborne, has been developed to handle more concentrated pesticides. This trend creates new problems in the preparation of satisfactory formulations with respect to their physical properties. It is the formulator who has the equipment and the technique to be the first to make top quality formulations in this high concentration range to assure a substantial profit before prices may soften.

Fine Spray Impregnation

While it was commonplace several years ago to impregnate insecticides onto clays from a drilled pipe, or flattened quarter-inch nipples spaced evenly along a pipe, the trend now is toward very uniform impregnation using calibrated spray nozzles.

It is possible with intensive blending, grinding and after-blending, to redistribute toxicant throughout a dust formulation from a poorly impregnated batch, to a degree that passable analyses may be obtained. Low concentration pesticide granules, if poorly impregnated, probably can not be mixed sufficiently to meet specifications. Most high concentrate formulations can not be made at all unless the impregnation is uniform.

To make granular pesticides and other new dry formulations, a good impregnation apparatus is essential. Six and preferably eight full jet nozzles should be spaced so that the maximum surface of the formulation is evenly covered without spraying on the blender parts.

Bulk Material Handling

Bulk material handling of raw materials, particularly solvents, carriers and diluents, should occur whenever a product market shows stability and longevity. Most formulators bulk store heavy aromatic solvents and kerosene. Some are beginning to handle granular clays in bulk.

The essentials for bulk handling of granules are railway sidings, storage space and large demand for the product. Large air tight bins should be provided to store the material and to prevent moisture from destroying part of the sorptive capacity of the granules. Air conveying systems, or elevators and chutes if the siding is close enough to the building, are the preferred methods of emptying the cars into the bins. Belt conveyors or screw conveyors, while less satisfactory, can be used in some cases.

Diversified Production

A fairly well-defined trend to formulate a diversified pesticide product line and have year-around production, is apparent and certainly justified. Any product that can be made in the off-season defrays the fixed plant costs and helps maintain an organization, the most valuable factor of the production system. We have talked about year-around production for a long time. It's being done and it's being done with small fixed work crews. Among the many advantages which are obtained from year-round production is the opportunity to assure quality of formulations. Suffi-

Turn to TRENDS page 27

Author Outlines Important Trends

TRENDS noted in this article are real and important to every pesticide formulator. While all "trends" do not necessarily develop into eventual tidal waves in an industry, it is well worth the time of each production man to consider carefully the direction being taken by different firms in the field and to apply this information to his own situation.

Author Smith points out that the new trends in pesticide formulating point particularly:

Toward Granular Formulations
Toward Multi-purpose Formulations
Toward Larger-Sized Granules
Toward More Concentrated Formulations
Toward Fine Spray Impregnation
Toward Bulk Material Handling
Toward Diversified Production
Toward Automatic Plants
Toward Liquid Formulations

All of these trends are significant. While not every single one will apply to the operations of any single company, the potential is there just the same.—Ed.

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Run-of-Pile

High porosity—high water soluble P_2O_5. Low moisture content and correct size distribution.

Granular

Uniform particle size, dust free, low moisture content—will not cake or lump under normal storage conditions. Guaranteed 46% Phosphoric Acid—available in bags or bulk.

Coarse

Controlled screen size honeycomb structure, high water soluble P_2O_5—for intermediate ammoniation to produce a semi-granular product.

3. PHOSPHORIC ACID

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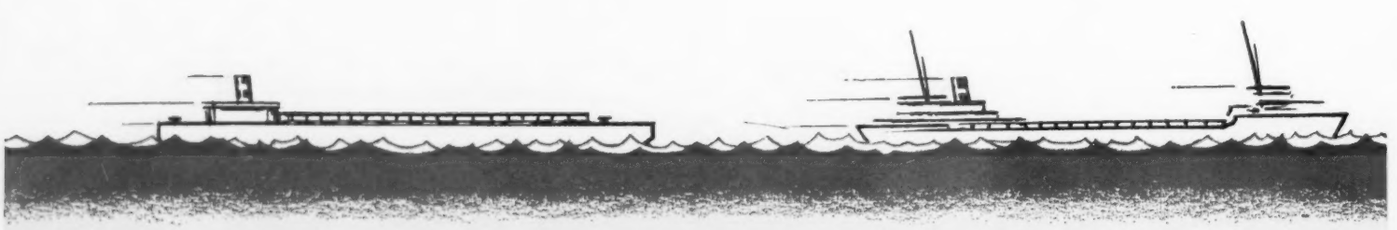

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FROM USPP !

Plus — see next page →

2. DI-MON A modified Di-ammonium Phosphate

18-46-0 Granular

A granular product of uniform particle size and guaranteed chemical analysis. Used efficiently and economically in producing most high analysis formulations and is particularly suited for ultra high analysis.

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If you can be served by water, USPP can serve you best. We maintain our own docks on Tampa Bay and your ship sails in a minimum of time, and of course, our trunk line rail connection is only minutes away.

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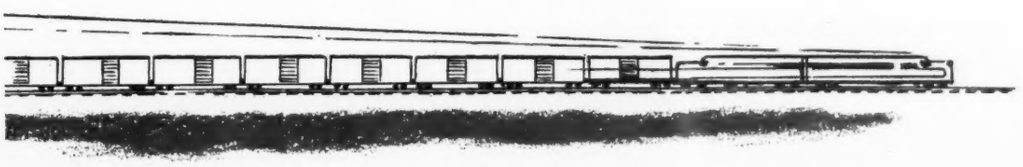

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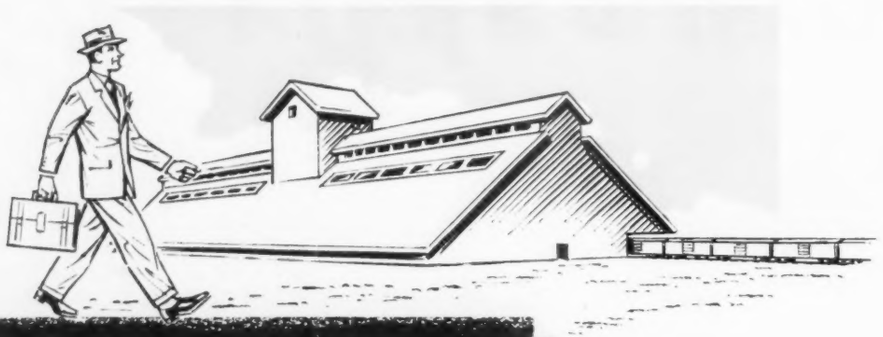

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Our field staff of technical representatives, with a thorough background in phosphate products and their applications in the fertilizer industry, are anxious to assist you in developing a more efficient and profitable operation. These technicians are conveniently located in the Midwest and are ready to serve you in a minimum of time — For their services, Contact BRADLEY & BAKER.

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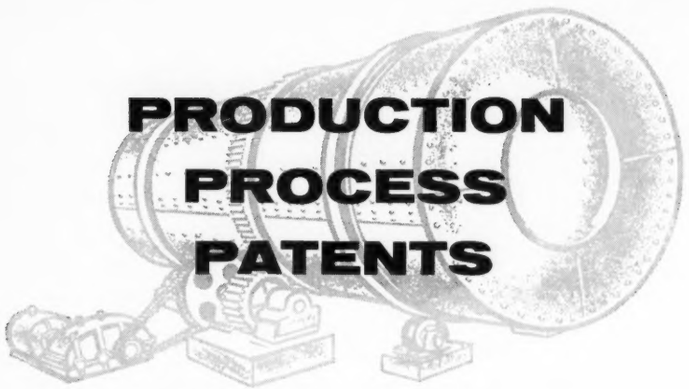


PRODUCTION PROCESS PATENTS

2,874,164

Concentration to Gamma Benzene Hexachloride by Distillation. Patent issued March 17, 1959 to Oscar H. Johnson, South Charleston, W. Va., assignor to Food Machinery & Chemical Corp., New York. The method of preparing a high gamma isomer fraction from a technical benzene hexachloride which comprises, dissolving a technical benzene hexachloride in an aliphatic organic solvent having a boiling point near that of the gamma isomer of benzene hexachloride selected from the group consisting of polyhydric alcohols having not more than three hydroxyl groups and glycol ethers, subjecting the solution to distillation temperatures under reduced pressures until most of the alpha and gamma isomers are codistilled, and separating the distillate into an alpha isomer enriched fraction and into a gamma isomer enriched fraction.

2,876,249

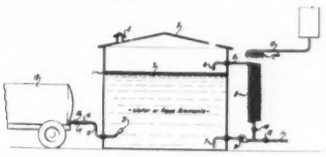
Process for Purification of Crude Pyrethrum Extracts. Patent issued March 3, 1959, to Thomas A. Haney, Stony Brook, N.Y., assignor to Olin Mathieson Chemical Corp. A method for the purification of a crude concentrated pyrethrum extract in which the solvent is a higher boiling hydrocarbon solvent and which contains approximately 20 to 30 weight percent of materials extracted from the pyrethrum flowers including the steps of admixing the extract with kerosene in amount such that the mixture contains from approximately 10 to 15 weight percent of pyrethrins and with a quaternary ammonium halide in amount such that the mixture contains from about 2 to 7 weight percent of said halide, agitating the mixture, cooling the mixture to from —10° C. to —30° C. for from about one to thirty hours, and at a temperature of from —10° C. to —30° C. separating the sludge present from the remainder of the mixture.

2,874,105

Preventing Corrosion of Ferrous Metals by Ammonia-Free Ammonium Nitrate. Patent issued Feb. 17, 1959, to Donald C. Young, Fullerton, Cal., assignor to Collier Carbon and Chemical Corp. In a process wherein an essentially ammonia-free aqueous solution of ammonium nitrate is maintained in contact with a ferrous metal comprising areas of internal stress subject to corrosion by said solution, the method of reducing the rate of said corrosion which comprises adding ammonium phosphate to said solution and maintaining a body of lead in physical contact with the resulting composition and in electrical contact with said ferrous metal, said ammonium phosphate being present in an amount corresponding to at least about 0.0005 part by weight per part by weight of the ammonium nitrate.

2,874,149

Ureas. Patent issued Feb. 17, 1959, to Fred Applegath and Raymond A. Franz, El Dorado, Ark., assignors to Monsanto Chemical Co., St. Louis, Mo. A process for preparing cyclic and polymeric ureas which comprises mixing carbon monoxide, sulfur and a compound selected from the group consisting of organic compounds containing at least two —NH_2 substituent radicals attached to different carbon atoms and organic compounds containing at least one —NH_2 substituent radical and at least one —NH— substituent radical attached to different carbon atoms and subjecting the resultant mixture to a temperature in the range of from about 60° C. to about 300° C. and a pressure of at least 30 p.s.i.a. for a time sufficient to produce the urea.



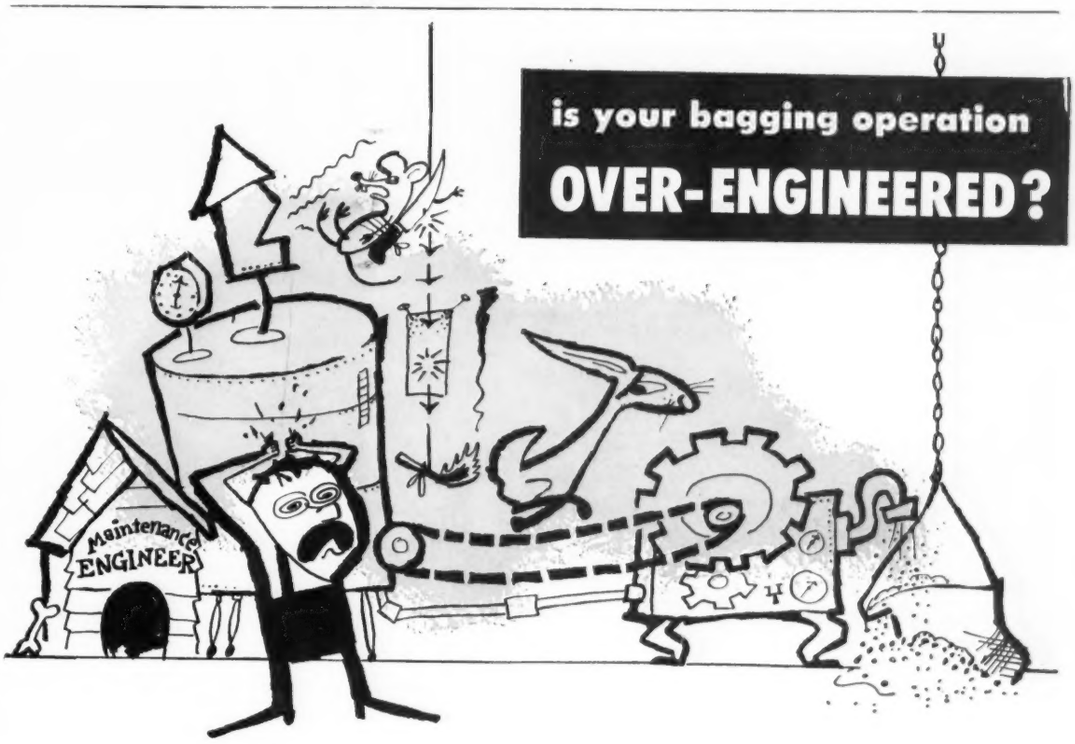
2,876,250

Process for Purification of Crude Pyrethrum Extracts. Patent issued March 3, 1959 to Thomas A. Haney, Stony Brook, N.Y., assignor to Olin Mathieson Chemical Corp. A method for the purification of a crude concentrated pyrethrum extract in which the solvent is a higher boiling hydrocarbon solvent and which contains approximately 20 to 30 weight percent of materials extracted from the pyrethrum flowers including the steps of admixing the extract with kerosene in amount such that the mixture contains from approximately 10 to 15 weight percent of pyrethrins and with about 0.01 to one percent by weight of trisodium phosphate dodecahydrate, based upon the weight of the crude concentrated pyrethrum extract plus added kerosene, heating the mixture at about 40° C. to 70° C. for about one to 24 hours, chilling the mixture at —10° C. to —30° C. for about one to 24 hours, and at a temperature of from —10° C. to —30° C. separating the sludge present from the remainder of the mixture.

2,879,151

Method of Producing Liquid Organic Plant Food. Patent issued March 24, 1959, to William M. Melville, Milwaukee, Wis. A method of obtaining a liquid organic plant food

Turn to **PATENTS** page 28



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- **IT'S SIMPLE!** Just one scale system—*not two or three*—fewer moving parts, wearing points.
- **IT'S FAST!** Up to 30 50-lb. bags per minute, up to 25 80's and 100's —more than a single sewing machine can handle.
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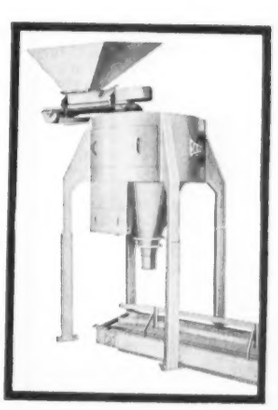

The SOUTHLAND costs less, *saves more* . . . less spillage and dusting; minimum headroom and floor space; simple installation and maintenance. Enthusiastic users say it's "tops" in dependability.

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To the Editor—

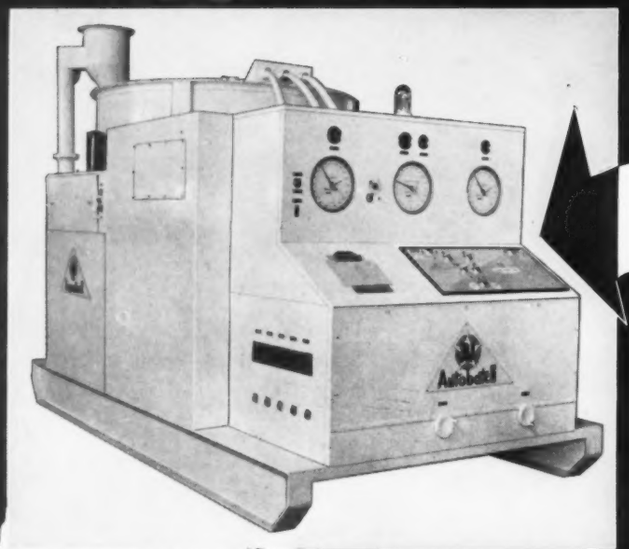
Recent articles have indicated that undesirable decomposition occurs, resulting in loss of nitrogen, when solutions containing ammonia, ammonium nitrate, and urea are added to sulfuric acid in a pre-reactor. Laboratory and pilot plant studies at the development center of Nitrogen Division, Allied Chemical Corp., have established operating conditions that avoid this effect. These conditions permit the use of this combination of materials in the pre-reactor with no serious loss of nitrogen.

An important point in the use of a pre-reactor, and one apparently not always recognized, is that the nitrogen solution should not be led into strong sulfuric acid. Instead, separate streams of the solution and acid should be led through well spaced feed points into a well agitated mass of hot, concentrated and only slightly acidic salt solution. The temperature is kept below 255° F. The pH is held in the range of 5 to 6 which can readily be done by using a small amount of phosphoric acid with the sulfuric acid.

As an example, under such conditions, input nitrogen from a solution containing 19.5% ammonia, 66.3% ammonium nitrate, 6.0% urea and 8.2% water has been recovered to the extent of 97 to 98% when producing a 16-8-8 product for which this solution provided all the nitrogen. No trace of brown color which would be caused by NO_2 was detected. On the other hand, when operating at a lower pH or higher temperature considerable losses of nitrogen were observed.

The ammonia, ammonium nitrate, urea solutions present advantageous properties of lower salting out temperatures and attractive ratios of free ammonia to salt nitrogen. From a plant operating standpoint, the conditions required for use of these solutions in the pre-reactor can be readily attained and easily controlled.—**Elmer C. Perrine, Nitrogen Division, Allied Chemical Corp., New York.**

1960's NUMBER ONE PROFIT OPPORTUNITY . . . WITH B&L LIQUID FERTILIZER UNITS



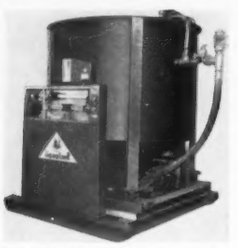
B & L AutobatcH SKID PLANT

The ultimate in batch-type liquid fertilizer processing. The B&L Complete AutobatcH Skid Plant is fully automatic, factory assembled — designed as a "Complete package" for ready installation by connecting raw material and discharge lines, and electrical connection. It provides a complete installation with a minimum of auxiliary equipment required.

B&L GRAPHIC CONTROL PANEL

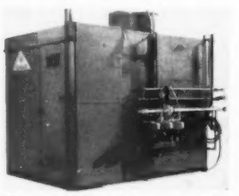
Furnished as standard equipment on the B&L AutobatcH line and provides remote control and operation of various components together with visual indication of the sequence involved. The routing of finished product to and from storage is by positive action air actuated valves.

B&L LiquibatcheR—An exceptionally low cost batch processing unit.



B&L LiqualizeR—Featuring exclusive "whirlpool" action.

B&L AutobatcH—Converts to continuous ammoniation process.



B&L CoactoR—High capacity continuous flow plant.

B&L ConverteR — Automatic or manually controlled "package units."

ALL B&L UNITS FEATURE THE EXCLUSIVE "B&L CONTINUOUS AMMONIATION PROCESS"*

This "process" makes possible the processing of raw materials such as super phosphoric and wet process acids providing product stability not possible in standard batch operations.

*Excluding only the B&L LiquibatcheR

NEED PROOF? CALL ON B&L! OUR CUSTOMERS CAN PROVE IT!

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CHEMICAL PLANTS DIVISION

BARNARD & LEAS Manufacturing Company INC.

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Davison Installs New Equipment for Superphosphate

BALTIMORE, MD.—Equipment for continuous production of superphosphate at a rate of 100 tons an hour has been installed by W. R. Grace & Co. Davison Chemical Division in its Curtis Bay Works here.

The new "Super Flo" installation, designed by A. J. Sackett and Sons Co. of Baltimore, replaces six batch-type units in the largest superphosphate plant under one roof in the world. Economically more efficient, the new equipment also gives a better product.

"Some advantages of the product are that it is easier to handle because it is more uniform in texture and practically dust free," a spokesman pointed out. "Porous grain structure and other physical properties make it an ideal product for use in critical ammoniation and granulation units. Continuous process control with narrow tolerances reduces any tendency to variability in analysis."

Davison supplies the product partly to other manufacturers who use it for producing mixed fertilizers; part goes to the company's own mixing operations, and a part is granulated for direct application to the land.

In the process, ground phosphate rock regulated by weight belt and sulphuric acid measured by magnetic flow meter are delivered to one end of the continuous system and partially cured superphosphate, discharged from the other end, is conveyed to storage.

IMC, Union Reach Agreement in Florida

BARTOW, FLA. — International Minerals & Chemical Corp. has entered into a three-year agreement with Local 35, International Chemical Workers Union, covering the company's phosphate minerals production and maintenance employees.

The new contract, which runs until May 15, 1962, provides immediate general wage increases averaging 7¢ an hour with automatic increases of 5¢ an hour at the end of the first and second years of the contract.

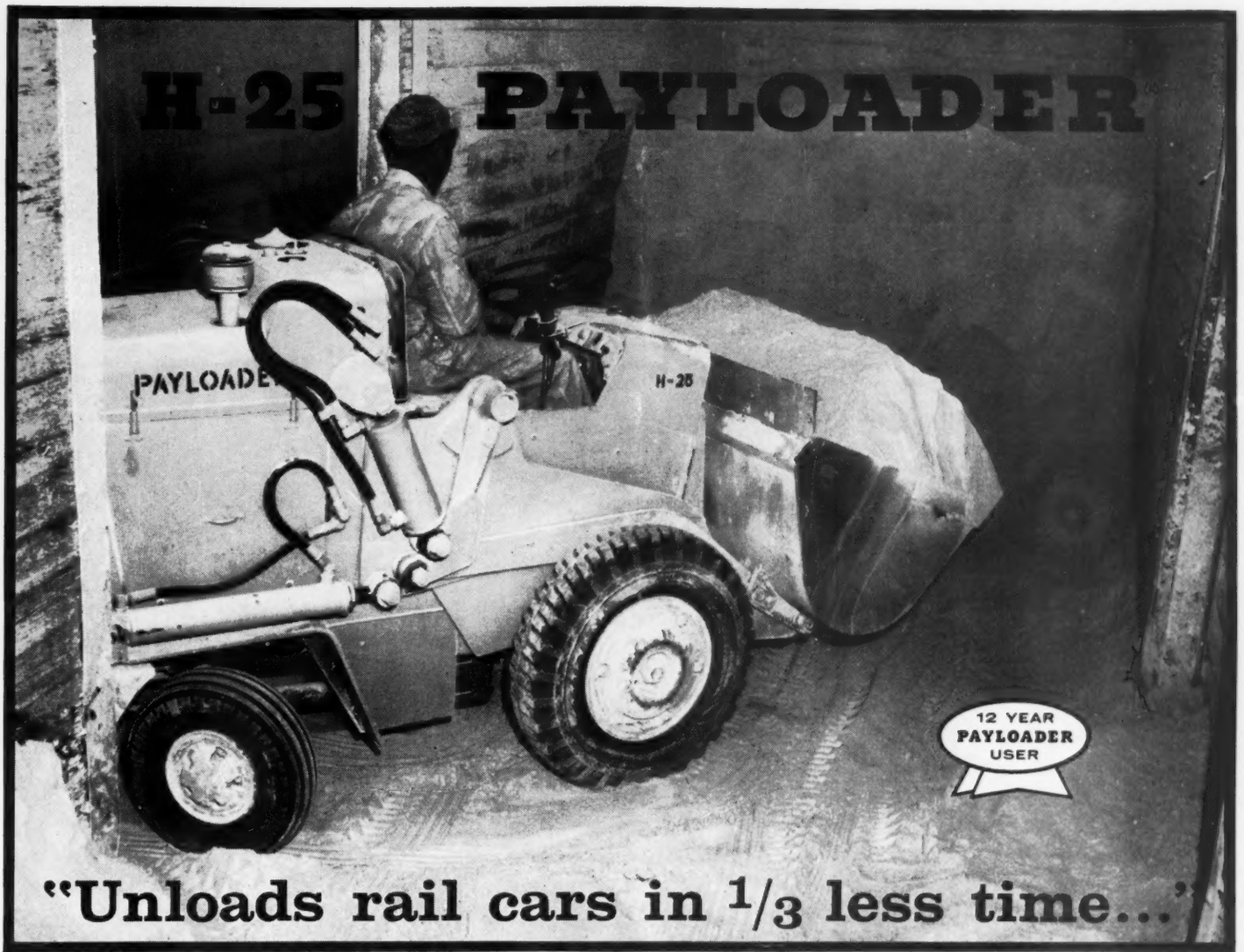
The contract adds an additional holiday for a total of eight per year, and provides for improved vacations calling for three weeks after 12 years, three weeks after 10 years starting next year, and four weeks after 25 years.

Introduces New Plastic Container

CHICAGO — A one-gallon, rigid polyethylene container said to be capable of handling a wide variety of liquids and designed to reduce significantly transportation and warehouse costs, has been introduced by Plax Corp., Hartford, Conn.

The container is blow-molded in rigid Marlex polyethylene produced by Phillips Chemical Co., Bartlesville, Okla.

The square-shaped container is two and a half pounds lighter than a glass jug of equal volume and takes up 37% less space, the makers say. It is shatterproof and resistant to corrosion and permeation by most chemicals.



"Unloads rail cars in 1/3 less time..."

" . . . It's fast and has adequate power to get full bucket loads under any conditions existing in our plant", continues D. W. Brant, Plant Supt. of Screven Oil Mill, Sylvania, Ga. "The H-25 is daily proving it's the ideal size machine for all phases of our fertilizer and limestone handling work. We have been using "PAYLOADER" units for 12 years with outstanding, continuous service and low repairs."

If you want top production from a six-foot-turning-radius machine, you should try a Model H-25. In carry capacity, in output, and in proven dependability it has no equal.

Other proven "PAYLOADER" models are also available, from 2,000 to 12,000 lbs. carry capacities, to meet your every material handling need. Your Hough Distributor is ready to serve you. See him today.

Maneuverability and Speed . . .

The H-25 with 2,500 lb. carry capacity, only 6 ft. turning radius and easy power steering, is the most concentrated package of tractor-shovel productivity ever designed. Power-shift transmission with two speeds forward *and* reverse, power-transfer "no-spin" differential, and 4,500 lbs. of bucket break-out force are other outstanding features that speed production and reduce operator effort.

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NEWS DIGEST OF THE WEEK

Joint Weed Conference

WINNIPEG, MAN.—A joint meeting of the Western Canadian and North Central Weed Control Conferences will be held at the Royal Alexandra Hotel here Dec. 7-10, according to an announcement made by H. A. Craig, chairman of the general arrangements committee. Details of the program agenda will be announced later.

Smith-Douglass May Merge With Smith Agricultural

NORFOLK, VA.—A possible merger between Smith-Douglass Co. and the Smith Agricultural Chemical Co. is being considered by the two firms, it has been announced. The companies, with headquarters at Norfolk, Va., and Columbus, Ohio, respectively, will within 60 days seek approval of their stockholders on the merger.

Smith-Douglass has 11 fertilizer production plants in the east and south and extends as far west as Minnesota. Smith Agricultural Chemical Co. has five plants in Ohio, Indiana and Michigan.

Eire Goes to NPK To Express Grades Of Fertilizers

DUBLIN, EIRE — The government of Eire is in the process of changing the expression of fertilizer content from the oxide basis to the elemental for phosphate and potash, dispatches from Dublin indicate.

The changes will be made under the country's "Feeding Stuffs and Fertiliser Act."

As in the U.S., nitrogen has always been expressed in its elemental form as "N," but phosphate and potash were designated in the oxide, P_2O_5 and K_2O, respectively. The three elements will be expressed as N-P-K when the law is changed.

Observers in Ireland grant that "there may be some confusion among farmers in the weeks immediately following the changeover, but this confusion can hardly be long-lasting and the general advantages of the change should soon be widely appreciated." The new act will come into force at a time when the Eire government is making a special effort to stimulate the use of fertilizers, particularly phosphates, to improve the value of grassland.

Reports indicate that the stimulus is being provided by a subsidy of 10s ($1.40) a ton per unit of phosphorus.

Middle West Safety School for Fertilizer Plant Supervisors Scheduled for August

CHICAGO — Fertilizer companies doing business in the Midwest are invited to send their plant supervisory personnel to an accident prevention school scheduled for Aug. 18-19 at the National Safety Council's Chicago headquarters.

The two-day program, sponsored by the Council's Fertilizer Section, headed by George L. Pelton, Smith Agricultural Chemical Co., in cooperation with the National Plant Food Institute, will cover many phases of safety education, methods of cutting accident rates and reducing costs.

John E. Smith, Spencer Chemical Co., Pittsburg, Kansas, will be chairman of the school, with Roger Hugg, International Minerals & Chemical Co., as co-chairman.

National Safety Council staff members, headed by Glenn Griffin, director of industrial training, are cooperating in setting up the program.

The Institute's Midwest division is assisting in the arrangements.

The program will include classes, discussion periods and group participation sessions. Among subjects will be "Fundamentals of Accident Prevention," "The Foreman's Safety Job," "Personal Factors in Safety," "Solving Safety Problems," "Discovering Accident Hazards," "Safe Handling of Materials in the Fertilizer Industry," "Teaching Job Skills," "Good Housekeeping in Fertilizer Plants," "Safety Service Available," "Safe Handling of Liquid Materials," and "Safe Handling of Insecticides."

Mr. Smith will direct a session featuring training on 26 different typical plant jobs in the fertilizer industry.

Instructors will include Mr. Smith;

HIGH-K

MURIATE OF POTASH for the PLANT FOOD INDUSTRY

THIS symbol stands for high-grade uniform, coarse and granular Muriate of Potash (60% K_2O minimum). Southwest Potash Corporation provides a dependable supply of HIGH-K* Muriate for the plant food industry.

*Trade Mark

Southwest Potash Corporation

61 BROADWAY ★ NEW YORK 6, N. Y.

3 or 2?

Diamond's six-pound killers give you the answer!

LINE RIDER herbicides are now available in SIX-POUND and equivalent low-volatile emulsifiable and oil soluble concentrates. Two gallons of these six-pound formulations contain as much acid equivalent as three gallons of four-pound concentrates.

You save on freight. You save on truck space. You save on storage. You save on handling and field application. All of these add up to savings in money.

Write for details. Diamond Alkali Company, 300 Union Commerce Building, Cleveland 14, Ohio.

Diamond Chemicals

Mr. Griffin; John Nahikian, Safety Council staff engineer; W. C. Creel, North Carolina Labor Department; L. L. Lortscher, Spencer Chemical Co., and Ralph Howard, Safety Council membership service director.

The registration fee will cover a set of instruction materials for each man attending the school, including safety supervisor's manual, instructional guides, posters, educational literature and other safety aids. Included, also, will be the cost of two luncheons.

The Midwest safety school is one of five being set up in various areas of the country. Opening the series will be the Northeastern regional school at Cornell University, Ithaca, New York, Aug. 11-12.

Other schools are slated for the Southeastern region, the Southwestern region, Northeastern region and the Western region, according to Paul T. Truitt, executive vice president of the institute.

Sedimentation of insolubles with or without a flocculating agent, will provide a clear liquid formulation, provided the formulation has been allowed to stay in the tank long enough to permit complete settling. After numerous batches have been drained from the sedimentation tank, the stand pipe is removed and the formulation containing the accumulated sediment is set aside for separate treatment, and the tank is carefully cleaned.

Heating of liquid formulations (if they will withstand heating) not only helps by reducing the viscosity to facilitate quick and complete mixing, but it usually changes the physical nature of trace insolubles in the formulation. In many cases these insolubles come out of solution on cooling, not as the very fine non-filterable material, but as rather large well-defined crystals which can be removed by a fine mesh line filter. Hold tanks also are used to separate foams which are formed during agitation in the formulation process.

Good equipment is a help in formulating pesticides, but much better quality products are made in poor equipment using good techniques, than in excellent equipment using poor practices.

Greater Capacity for Fluid Energy Mill Unit

An error occurred in the reported capacity of one of the fluid energy mills pictured in the May 11 issue of the Production Edition, it has been pointed out by Joseph P. McKenna, Fluid Energy Processing & Equipment Co., Philadelphia, maker of the equipment featured in the article.

The double unit, used in grinding at unusually high production rates should have been described as having a feed rate of 3,500-7,000 lb. an hour of 50% DDT. The cut caption appearing in the article erred in placing this capacity at about half the correct figure. We regret this error.

Oregon Fertilizer Sales Up at 1st Quarter Mark

SALEM, ORE. — Oregon farmers bought almost 4,000 tons more of fertilizers in the first three months of 1959 than in the same period last year, according to the inspection fee reports made to the state department of agriculture here. The 61,681 tons this year compares with 57,700 one year ago.

Sales of agricultural limes climbed, too, from 17,468 tons a year ago to 28,751 tons in the first three months of this year.

But farmers didn't use as many agricultural minerals, which include gypsum, borax and soil sulphurs. Tonnage reported sold the first quarter this year was 4,939.

TRENDS

Continued from page 19

cient time is available in off-season production, to observe the physical properties and measure the chemical properties of the formulations after storage. Production techniques and formulation quality can be improved in slack periods.

Trend to Automatic Plant

Is there a trend to automatic plants? Plants vary from an almost completely push button plant to 55-gallon drum and wooden paddle operations. There is a movement to perform certain operations automatically and of these, automatic weighing is probably of some significance. The automatic recording of weights will detect and prevent mis-formulation in most cases. By the use of recording load cells, all equipment can be mounted so that a continuous record is made of each formulation batch.

Liquid Formulations

Several years ago, liquid formulations took over a big part of what was once a dry formulation market. In many areas, cotton toxicants changed to liquids, particularly for early applications. The trend to liquid formulations is still going on, arrested somewhat by the swing to granular pesticides, but as the trend continues it will be necessary to have adequate liquid formulating equipment to meet the increased demand.

Besides the conventional melting kettles and mixing kettles, other essential equipment such as hold tanks, filling machinery, filters and pumps should be installed. The design should take into account the instability and greater toxicity of some of the newer pesticides that will have to be handled in the equipment.

Many technical pesticides contain traces of related materials differing in solubility from the main component. While these materials do not impair the effectiveness of the pesticide, they do affect the appearance of the liquid formulated product if it is packaged in glass. Fine mesh straining of liquid formulations is always recommended. Very fine precipitates may have to be removed with filter aids in plate filters if the liquid formulation is to be packaged in glass.

Whether or not the product is regularly filtered, several formulating procedures are available that will substantially reduce the insolubles problem. A hold tank, whether this is the formulating tank or a separate tank, should be provided with a decantation apparatus for draining off the contents into the filling line. Decantation can be accomplished by pumping out of a floating discharge to a certain level or by using a gravity drain through a stand pipe.

NEW FROM MONSANTO: *Three new products that deliver more value to the farmer, more sales to you and your dealers!*

1. NEW

LION E-2®

The first truly noncaking, super-dense ammonium nitrate on the market. Guaranteed 33.5% nitrogen. LION E-2 ends storage problems and customers' complaints.

2. NEW

LION® UREA

High-analysis 45% nitrogen, prilled to resist caking. Easier to store, easier to handle; new Lion Urea yields more nitrogen per bag than other forms of solid nitrogen.

3. NEW

LIQUID NITROGEN FERTILIZER

Contains three forms of nitrogen—nitrate, ammonia, and urea—for triple-action grow power. Gives crops a boost in three different stages of continuous fertilization. Easiest to apply. Available in 28%, 30% or 32% concentrations.

Monsanto®

PLUS:

FERTILIZER RAW MATERIALS

A dependable source of nitrogen solutions for manufacturing (Ammonia, Ammonium Nitrate, Urea—all grades), Anhydrous Ammonia, Sulfuric Acid and Phosphoric Acid. Delivered to you promptly by tank car and truck.

Make Monsanto your one-stop source for major fertilizer nutrients.

Contact these District Sales Offices for fast, reliable service:

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Monsanto®

Monsanto Chemical Company
Inorganic Chemicals Division
St. Louis 66, Missouri

PATENTS

Continued from page 23

by flushing with water a mixture of dairy cattle manure compost and dried brewers yeast comprising, the steps of first arranging said mixture in perforated trays one above the other and allowing said mixture to work under controlled temperature of between 70 and 75 degrees Fahrenheit and moisture content for a period of 24 hours, flushing said mixture with water, said water progressing by stages through said mixture under controlled periods and under controlled temperatures again between 70 and 75 degrees Fahrenheit, drawing off said resultant liquid, adding additional mineral elements to said liquid including sulphur, magnesium, calcium, iron and zinc from sulfates, allowing said resultant liquid to work under further bacteria action and said controlled temperature for a period of several days to ten days, said resultant balanced liquid being characterized by its color of rich nutritious earth and its ability to maintain said elements in suspension.

2,885,279

Plant Food Manufacture. Patent issued May 5, 1959, to Everett N. Mortenson, Chicago, assignor to Swift & Co., Chicago. A continuous countercurrent process for the manufacture of mixed phosphatic fertilizer, which comprises charging fertilizer solids material containing acidic fertilizer ingredients into a first reaction zone, reacting said fertilizer solids in said first reaction zone with ammonia vapors from a second reaction zone to form reaction products thereby increasing the nitrogen content of said fertilizer ingredients, passing the fertilizer material including said reaction products to said second reaction zone, charging liquid anhydrous ammonia to said second reaction zone, contacting the fertilizer material with liquid anhydrous ammonia in said second reaction zone to cool the reaction products and vaporize the ammonia, passing the vaporized ammonia from said second reaction zone to said first reaction zone, and discharging cooled mixed fertilizer from said second reaction zone.

2,885,416

Process of Preparing Zinc-Containing Fungicides. Patent issued May 5, 1959, to Dino Costabello, Norara, Lido Porri, Milan, and Gioacchino Boffa, Novaro, Italy, assignors to Montecatini-Societa Generale per l'Industria Mineraria e Chimica, Italy. A process for making a fungicidal product, which comprises preparing an aqueous solution of a mixture of ethylenediamine and polyethylenepolyamines hydrochlorides containing 65 - 80% ethylenediamine hydrochloride, 19-29% diethylenetriamine hydrochloride, 1-4% triethylenetramine hydrochloride, and up to 2% higher polyethylenepolyamines hydrochlorides as obtained from the reaction between dichloroethane and ammonia, adding at room temperature an amount of caustic soda in aqueous solution sufficient to liberate the amines from the hydrochlorides and to neutralize subsequently formed dithiocarbamic acids, treating the alkaline solution at 20-35° C. with an amount of carbon disulfide stoichiometrically equivalent to the amine nitrogen present to form said dithiocarbamic acids, adding diluted hydrochloric acid until the solution is neutral against phenolphthalein, and precipitating the fungicidal product by adding at room temperature, while stirring, a 1-2% excess over the stoichiometric amount of an about 60% aqueous solution of an inorganic zinc salt taken from the group consisting of zinc chloride and zinc sulfate.

PLANT

Continued from page 4

fertilized as one would expect, but extra care is exercised to keep it neat and to maintain flower beds at strategic spots around the grounds.

To keep the neighborhood happy and free from dust and fumes from the plant, the company employs a series of cyclones which siphon off steam and dust and prevent its escape into the community.

When the plant was erected in July, 1948, the site was "out in the country." But in the intervening 11 years, the city has grown up around the area and now a new school building, new churches, apartments, a large supper clubhouse and private homes almost completely surround the plant. "This situation makes our public relations program a real 'must'," Mr. Mawhinney says. He adds that the efforts spent in this direction are paying off and the firm expects to continue its emphasis along this line.

Mr. Mawhinney participates in many civic activities and has succeeded in building a highly favorable image of his plant in the minds of the people. He is president of the PTA at the new junior high school near the plant; was first president of the city's United Fund drive; was instrumental in the formation of a local club interested in preventing water pollution; and is active on a committee which seeks new businesses for the community.

Production-wise, the Albert Lea plant strives for greater efficiency all the time, and has modern machinery in the plant to bring this about. It produces popular granular analyses in accordance with university recommendations and soil testing laboratory findings, in both Iowa and Minnesota.

To meet demands in this direction, the firm has added an efficient liquid plant in connection with its dry business. Arrangements have been made with the Pierce Truck Lines of Freeborn, Minn., to do the custom application work and also other transportation duties for Smith-Douglass. The fertilizer firm does not own application equipment at the present time, Mr. Mawhinney said.

Good public relations, an efficient plant and modern production equipment throughout all add up to good business, Mr. Mawhinney says. His operation in Albert Lea is proof of his word.

"Great, Bill...this SPM

...it took Bill just 15 minutes to review the Sul-Po-Mag program and magnesium story.

Alf Oines (right), and Bob Freske (center), president and vice-president of the Michiana Chemical Co., of Niles, Michigan, will continue to profit from the SPM program. They're shown here with Bill Lane, IMC Potash sales representative.

3. *"Bill, you may recall that we recently used various elements of your program . . . mailers, envelope stuffers . . . and found them very helpful in pushing our own brand. And we may want to take advantage of your imprinting service on some of the other materials."*

4. "Here are examples of our Sul-Po-Mag editorial ads that are being run in farm publications this year. Each ad creates awareness of a need for magnesium . . . tells farmers the name of the product that corrects or prevents it . . . and displays the seal as the sign of Sul-Po-Mag."

Ask your IMC potash representative how the Sul-Po-Mag seal program can help boost your fertilizer sales

From its start several years ago, International's Sul-Po-Mag sales program has rapidly gained momentum. Sul-Po-Mag is well accepted as the ingredient in your mixed fertilizers to prevent and help correct magnesium deficiencies.

The SPM program is supported by full-scale national and local informational and product advertising. Ads written for specific crops are directed to growers throughout the nation. Growers of tobacco, potatoes, fruits and vegetables are all receiving SPM information. These magazine ads are backed up by radio commercials, direct mail, and publicity. Also, a large amount of work is being done to promote magnesium through influence groups such as county agents, vo-ag teachers and agricultural extension people.

The net effect . . . growers and influence groups are becoming more acquainted with the growing problem of magnesium deficiency. Sul-Po-Mag is widely recognized as the best way to combat magnesium shortages. As a result more and more growers are looking for the SPM seal on the mixed fertilizers they buy.

Fertilizer manufacturers using Sul-Po-Mag can take advantage of this promotion by identifying themselves and their products with newspaper ad mats, tags, seal imprints, imprinted direct mail pieces and posters . . . all available at no cost. For full information on the SPM program — and for information on IMC's full line of potash products — contact your International representative or write c/o the address at right.

Approved Methods Key to Transferring Ammonia Tank to Tank with Safety

SAFETY factors involved in the various handling steps of anhydrous ammonia are of utmost importance to production personnel who have to supervise or instruct others in this work, or who at times must do the job themselves. One of the critical phases of ammonia handling comes in the transfer of materials from tank to tank.

The Division of Industrial Safety of the State of California has issued a set of standards which could well be observed by plant people everywhere who must work with this nitrogen source.

Here are some of the rules laid down in the Division's "Unfired Pressure Vessel Safety Orders." Even though the specific language used in the laws of other states may vary somewhat, the general warnings are the same and the following rules are good ones to follow:

"No anhydrous ammonia shall be vented to the atmosphere during the transfer operation unless the vent is led to a safe point of discharge," the law states.

"No gas other than anhydrous ammonia vapor shall be used to displace anhydrous ammonia during the transfer operation.

"All filling connections and/or permanently installed transfer hoses shall be equipped with a shutoff valve at the discharge end and shall be kept effectively capped when not in use. These caps or plugs may be plastic or metallic, but must be so designed that they will be vented to the atmosphere while at least three (3) full threads are engaged.

"During the transfer of anhydrous ammonia, at least one (1) attendant familiar with the installation shall remain in attendance at the controls necessary to stop the transfer operation. This attendant may be considered familiar with the installation only after he has been provided with a set of operating instructions for the unloading operation and has been instructed through a minimum of three (3) full cycles of operation. During the transfer of anhydrous ammonia into or from a transportation tank, the brakes of the transporting vehicle shall be set and the wheels blocked.

"No anhydrous ammonia shall be transferred with the point of delivery less than ten feet (10') from any residential building, street, public highway, or sidewalk unless the failure to transfer would create a hazard.

"All pumps used for the transfer of anhydrous ammonia shall be suitable for this service and shall be equipped with a pressure-actuated bypass valve and/or other acceptable device to prevent pressure in the transfer equipment of more than four hundred (400) psi unless the piping system is specifically designed for higher pressures. In no case shall safety relief valves used for this purpose be set to open at pressures of less than three hundred twenty-five (325) psi.

"To provide for expansion of anhydrous ammonia with temperature, the tanks shall not be filled to a greater fraction of their volumes than that shown in Table 1. The filling temperature shall be used to determine the outage required. For unrefrigerated tanks sufficient outage shall be maintained to prevent the tank being completely full of liquid at a temperature of less than one hundred thirty degrees F.

TABLE 1. Minimum Outage Volume Required for Various Filling Temperatures

Temperature degrees fahrenheit	Outage in percent of tank volume
130	0
120	1.71
110	3.30
100	4.79
90	6.18
80	7.53
70	8.78
60	9.99
50	11.1
40	12.2
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"Every portable unloading facility shall comply with the following additional requirements:

(1) "A set of written instructions shall be posted at the location or supplied to the operating personnel, describing in detail the proper procedures to follow in operating the transfer equipment.

(2) "A container of at least five gallons (5 gal) of fresh water shall be located at this facility. This container shall have a suitable opening to permit the application of water to flush the eyes.

(3) "The point of delivery from portable transfer facilities shall be in compliance with the requirements for stationary tanks, as listed in Order 501 (c); except that such point of delivery may be less than fifty feet (50'), but not less than twenty-five feet (25'), from a highway or main track of a railroad.

(4) "The working area at the portable transfer facility shall be kept clear of debris, and all compressors, pumps, hoses, valves, etc., shall be protected from vehicle impact. Such equipment shall also be suitably locked or otherwise confined when unattended, to prevent the release of ammonia to the atmosphere by unauthorized persons.

(5) "The portable unloading facility must be secured at the end of each period of operation; i.e., the point at which it becomes unattended, the end of a workday, etc.

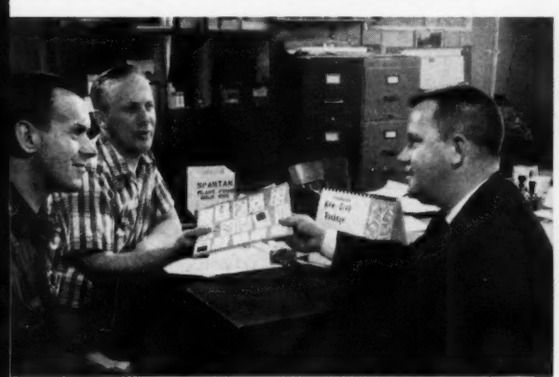
"The facility will be considered secured when all ammonia liquid is confined in the pressure vessel and the gas pressure in any hose is less than twenty-five (25) psi.

(6) "All pressure vessels, hoses, pipings, fitting, etc., shall be as required elsewhere in these orders for anhydrous ammonia in the liquid state (high pressure)."

program should really help sales!"

1. "The SPM informational advertising program has made a terrific impact on the market. As an example, we've received requests for product information from thousands of large growers and influence people. It indicates to us that growers are becoming more and more interested in magnesium."

2. "Although our advertising is primarily informational, we use the seal in each ad to acquaint buyers with the sign that identifies fertilizer with Sul-Po-Mag. As you know the SPM seal is available in printing plates, proofs, stickers, or tags so you can take advantage of our Sul-Po-Mag promotion."



5. *"Sounds interesting, Bill . . . but could you leave this brochure with us? We would like to look it over and study your program in detail. I'm sure your materials may fit into our own advertising program."*

6. "Thanks for your time, Alf and Bob. I'll keep you informed on everything new in our program, but if you have any questions or would like to use some materials, just let me know."

By including Sul-Po-Mag as your source of magnesium and sulphate of potash in your mixed fertilizers, you'll profit from this hard-working sales promotion campaign.

HERE'S THE FULL LINE OF IMC POTASH PRODUCTS

Standard Muriate of Potash | Coarse Muriate of Potash | Granular Muriate of Potash | Sulphate of Potash | SUL-PO-MAG® double Sulphate of Potash-Magnesia

MINERALS International CHEMICALS

PRODUCERS OF LIVING MINERALS

26-59 R

POTASH DIVISION

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

Administrative Center: Skokie, Illinois

PRODUCTION EDITION

Editorial

Increasing Fertilizer Sales Efforts to Reflect in Greater Production Activities

By Richard E. Bennett
Farm Fertilizers, Inc.
Omaha, Nebraska
President, National Plant Food Institute

IN ALL PARTS of our country, on practically every crop, the use of fertilizer in various forms is an accepted necessity if the grower expects to compete in the present farm situation. The extra yields brought about through employment of plant food, plus the reduction of unit cost, permit a better margin of profit than would be at all possible in the face of the farmer's continuing cost-price squeeze.

Richard E. Bennett

As president of the National Plant Food Institute I have been in an unusually fine position during the past year to observe some agricultural economic forces at work both on a local level and on a wide scale. All fertilizer manufacturers, whether members of NPFI or not, have benefited and will continue to see the fruits of the institute's expansion program and educational efforts.

Allow me to show how some of the NPFI projects point to increasing tonnage and will thus make for improvements in plant food production techniques. It is going to take a lot of tonnage to meet the needs of agriculture in just a few years. This added volume will make necessary the adoption by our industry of better and more efficient machines to manufacture, transport, and package the increased tonnage which will be produced shortly.

There is likewise a challenge for the industry in the matter of quality of product. Today's standards will undoubtedly be eclipsed by subsequent findings of researchers who are continually on the job seeking new and better ways to improve fertilizer manufacturing procedures. Progress has come rapidly during the past decade or so, but new methods and techniques, as well as new chemical compounds, promise even greater forward strides than the trade has ever seen before.

The industry itself is doing more and more of its own researching, which appears to me a sign of maturity and good solid thinking ahead. Although governmental agencies have made valuable contributions to fertilizer technology and continue to do so, it would be a serious mistake for any industry, particularly one as basic and important as ours, to sit back and wait for developments from that source exclusively.

Through the efforts of its trade association, the plant food industry of the U.S. is moving ahead much more rapidly than could individual manufacturers seeking to solve their own problems and to promote their products beyond the relatively small marketing areas in which they may operate.

The various projects of the National Plant Food Institute have gone far in developing markets, showing farmers how they might meet the challenges of the times through the use of more fertilizers. The establishing of regional offices in strategic locations around the country has helped greatly in this. Results of these efforts are being felt strongly at the present time, even though the program has been under way for only a little longer than a year.

The crop production potentials program in several midwestern states is an example. It was developed in cooperation with soils specialists at the agricultural colleges in the region, with a two-fold purpose:

1. To help the farmer cut his unit costs of production and boost his profits from each acre.

2. To give the farmer effective information on how he can do a more efficient job of producing crops.

Wall charts and other educational materials have been distributed to and used by county agents, vocational agricultural teachers and other extension personnel who cooperate with the institute in getting this authentic news to the farmers.

One of the most effective ways to stimulate use of plant food is through the medium of the soil test. In some areas, it has been found that fertilizer volume can be actually doubled through the promotion of soil tests by farmers who previously had not known with any accuracy that certain elements were lacking in their soils. Upon receiving accurate scientific analysis of tests from their own land, they are willing to listen when suggestions are made to "double the use of N" or of one or both of the other elements.

Agricultural colleges in nearly every state have made admirable progress in publishing and broadcasting demonstration results and county agents likewise urge farmers to attend field days or local demonstrations. The added weight of the Plant Food Institute behind this type of program gives much more impetus than might otherwise be achieved by such programs. The institute is proud of its record of having provided demonstration programs, cartoon mats for newspapers, radio and television productions, feature articles for farm and business magazines as well as sound-and-color motion pictures for the education of lay audiences.

Many areas of fertilizer use are still in their infancy. Among these are forest fertilization; the combination of irrigation-fertilization programs in presently arid regions; the pasture and rangeland fertilization program and to a considerable extent, the federal and state road-building projects which include, aside from hard-surfaced roadways, landscaped areas which highway officials want to keep as lush and green as possible for a maximum number of months of the year.

Back of all of these programs, however, lies the necessity as mentioned previously, of producing high-quality plant food in keeping with the

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Croplife's Home Office

Croplife®
PRODUCTION EDITION

EPA — *Member of Business Publications Audit*
NBP — *Member of National Business Publications*

CROPLIFE is a controlled circulation journal published weekly. Weekly distribution of each issue is made to the fertilizer manufacturers, pesticide formulators and basic chemical manufacturers. In addition, the dealer-distributor-farm adviser segment of the agricultural chemical industry is covered on a regional (crop area) basis with a mailing schedule which covers consecutively, one each week, three geographic regions (South, Midwest and West) of the U.S. On the fourth week, production personnel in fertilizer manufacturing and pesticide formulating plants throughout the U.S. are covered in depth. To those not eligible for this controlled distribution, Croplife's subscription rate is $5 for one year ($8 a year outside the U.S.). Single copy price 25¢.

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Managing Editor

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(Address Mail to P. O. Box 67, Minneapolis 40, Minn.)

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Industry Meetings

June 9-10—Seventeenth Annual Convention of the Association of Southern Feed and Fertilizer Control Officials, Velda Rose Motel, Hot Springs, Ark.; Maurice Rowe, Virginia Department of Agriculture, 1122 State Office Bldg., Richmond 19, Va.

June 9-11—Pilot plant demonstration on recent developments in fertilizer production technology. Muscle Shoals laboratories, Muscle Shoals, Ala.

June 11-13—Manufacturing Chemists' Assn., The Greenbrier Hotel, White Sulphur Springs, W. Va.

June 14-17—National Plant Food Institute, Annual Convention, the Greenbrier, White Sulphur Springs, W. Va.

June 29-30—Seventh Annual California Fertilizer Conference, University of California, Davis, Cal.

July 7-9 — Pacific Northwest Plant Food Assn., 10th Annual Regional Fertilizer Conference, Tacoma, Wash.

July 15-17—Southwestern Fertilizer & Grade Meeting, Galvez Hotel, Galveston, Texas.

Aug. 18-22—Canadian Fertilizer Assn., Bigwin Inn, Lake of Bays, Ontario.

Sept. 24-25 — Annual Northeastern Fertilizer Conference, National Plant Food Institute, Biltmore Hotel, New York.

Oct. 13-14—Fall meeting, Western Agricultural Chemicals Assn., Villa Motel, San Mateo, Cal.

Oct. 21-23—National Agricultural Chemicals Assn. 26th annual meeting, French Lick-Sheraton Hotel, French Lick, Ind.

Nov. 4-6—Fertilizer Industry Round Table, Mayflower Hotel, Washington, D.C.; Dr. Vincent Sauchelli, National Plant Food Institute, chairman.

Dec. 7-10 — Western Canadian and North Central Weed Control Conferences, Royal Alexandra Hotel, Winnipeg, Man., Canada.

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Chemical Firms Awarded for Safety

WASHINGTON — Certificates of achievement have been awarded to 430 chemical plants which were operated throughout 1958 without a single disabling injury, the Manufacturing Chemists' Assn. has announced.

To qualify for MCA's award, in addition to its injury free record, a plant or laboratory must be a self-contained unit of its parent company, must have worked a minimum of 20,000 man-hours and must be engaged in chemical manufacturing operations or research.

Of the 430 certificates, 32 were earned by plants working in excess of one million man-hours during the year and a further 38 by plants working between 500,000 and one million man-hours.

Among the winning companies were a number in the agricultural chemical firms including:

E. I. du Pont de Nemours & Co., Inc.; Allied Chemical Corp.; Stauffer Chemical Co.; American Cyanamid Co.; Monsanto Chemical Co.; Union Carbide Corp.; Canadian Industries, Ltd.; W. R. Grace & Co.; Hercules Powder Co.; Olin Mathieson Chemical Corp.; Food Machinery and Chemical Corp.; Pennsalt Chemicals Corp.; Diamond Alkali Co.; Atlas Powder Co.; the Dow Chemical Co.; Phillips Petroleum Co.; U.S. Steel Corp.; the Harshaw Chemical Co.; Pittsburgh Coke & Chemical Co.; Merck & Co., Inc.; Victor Chemical Works; Escambia Chemical Corp.; International Minerals & Chemical Corp., and Shell Chemical Corp.

ORGANICS

Continued from page 2

ing to concede—at least not on any evidence yet adduced from the Haughley experiment or elsewhere—that NPK fertilizers can be dispensed with in modern farming practices.

Assuming, for example, that at least one percent of organic matter is needed in a soil, this means having at least 20,000 lb. an acre in the upper six inches of soil. The only economical, practical method of providing this necessary amount is to grow it as a fertilized, grass-legume cover crop and turning it under. Intensive farming practices demanding a high level of fertility will produce a thick residue of roots and crop debris which contribute substantially to the maintenance of soil organic matter. Commercial fertilizers applied in amounts sufficient to correct soil deficiencies for maximum acre yields plus sound soil management practices give sustained, profitable crop yields.

Hence, the slogan, "organic farming with chemicals."

SAFETY INSPECTIONS NEEDED FREQUENTLY

In any operation involving the manufacture of fertilizers or pesticides, safe working conditions will result only from constant supervision and frequent inspections.

Atlas Appointment

WILMINGTON, DEL. — The appointment of Cornelius D. McGrath as field sales manager of the chemicals sales department of Atlas Powder Co. has been announced by Edward J. Massaglia, vice president and general manager of the chemicals division.

WHO'S RESPONSIBLE FOR HOUSEKEEPING?

While every employe should wish to do his part toward keeping his workplace clean and orderly, housekeeping is primarily a duty of management. Management must plan so that all operations will be orderly; provide storage places for materials, racks or holders for tools and portable equipment, or containers for materials in process; and in general see that everyday housekeeping and order are maintained as a fundamental part of all that is done.

Finally, management must train each employe to do his part, for a single bad housekeeper in an establishment not only leaves much disorder in his path but also sets an example disruptive of the morale of all.

One manufacturer felt so strongly about its housekeeping responsibilities and those of its employes that it established the policy expressed in the following declaration:

That dirt is always evidence of waste, either of material or of energy or both.

That cleaning up a lot of dirt and disorder is a janitor's work, but that preventing this disorder is management's job.

That if you can't manage to have order in your department, you can't manage your department.

That if you are working in dirt and disorder, your costs are higher than they should be.

The foreman's place in housekeeping is important. There are few responsibilities of the foreman with less glamour than his housekeeping duties, and few pay off as well. Since the working force of a company is its most valuable asset, helping employes avoid injury through maintaining an orderly department makes sense.

The foreman as the key figure of a plant safety program is in the very center of all housekeeping activities. Being responsible for both production and safety, he can utilize good housekeeping to help both.

Below is a check list to help meet the needs of the plant so far as good housekeeping is concerned. Going over this list item by item will point up any poor practices and will provide a place where housekeeping committees can make regular checks.

Are dust and spilled materials cleaned up each day?	Yes ☐	No ☐
Are objects and materials kept off steps and platforms around machines?	Yes ☐	No ☐
Is there sufficient room between machines for safe operation?	Yes ☐	No ☐
Are aisles wide enough for traffic and marked adequately?	Yes ☐	No. ☐
Are machines and tools waiting for repair carried to machine shop?	Yes ☐	No ☐
Are materials and objects properly piled?	Yes ☐	No ☐
Are spilled liquids cleaned up and source of leaks stopped?	Yes ☐	No ☐
Are fire extinguishers in good shape and placed to be immediately available?	Yes ☐	No ☐
Are floors in good condition and free from holes, slipperiness and stumbling hazards?	Yes ☐	No ☐
Is excessive dust eliminated at bucket elevator, screen, and cage mill?	Yes ☐	No ☐
Are light bulbs free from excessive dust, all burning and providing adequate light?	Yes ☐	No ☐

Similar lists should be prepared for the grounds surrounding the plant, and also in the locker rooms.

—W. C. Creel, chairman, Safety Director, North Carolina Department of Labor.

Classified Ads

Classified advertisements accepted until Tuesday each week for the issue of the following Monday.

Rates: 15¢ per word; minimum charge $2.25. Situations wanted, 10¢ a word; $1.50 minimum. Count six words of signature, whether for direct reply or keyed care this office. If advertisement is keyed, care of this office, 20¢ per insertion additional charged for forwarding replies. Commercial advertising not accepted in classified advertising department. Display advertising accepted for insertion at minimum rate of $11 per column inch.

All Want Ads cash with order.

MISCELLANEOUS

BRUSH AND WEED KILLER

KILL SUBMERSED water weeds which foul up motor propellers, tangle fishing gear and choke irrigation ditches with R-H Granular Weed Rhap. Inexpensive, easy to use, sure results. For details write Reasor-Hill Corporation, Box 36CL, Jacksonville, Ark.

KILL BRUSH at low cost with amazing R-H Brush Rhap. Will not injure grasses, grains, cattle, or other animals. See your dealer, or write Reasor-Hill Corporation, Box 36CL, Jacksonville, Ark.

EDITORIAL

Continued from page 30

sales pitch being given these materials by educators, county agents, college extension people and the institute itself. High analysis goods will probably develop into even higher plant food content in the years ahead, and all this is to the good.

Problems of manufacturing, of safety, of economics, and other phases of production must be studied and eventually overcome, by whom? By the people in the industry itself!

It is our own future that is at stake. Greater tonnage, broader use of plant food on more crops than ever before; demands for improved physical condition of fertilizers; and expansion into liquids as well as the traditional solid mixtures all add up to a much greater challenge than the industry has seen for many years.

From what I have been privileged to see of the American fertilizer industry during the past year, in connection with duties associated with being an officer of NPFI, I am very optimistic about the future of the industry.

We have the production facilities to manufacture superior products, and are likewise well equipped, sales-wise, to see that the output of our plants is correctly distributed into every field of our vast agricultural proving ground.

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